THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXVI. No. 2142.] LONDON, MAY 31, 1904. [56TH YEAR. PRICE 6d.

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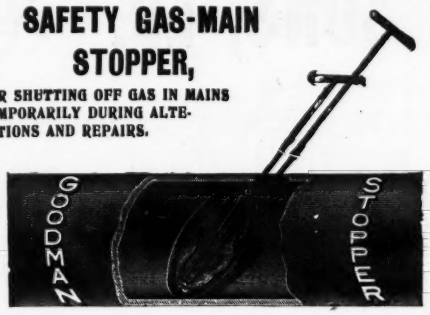

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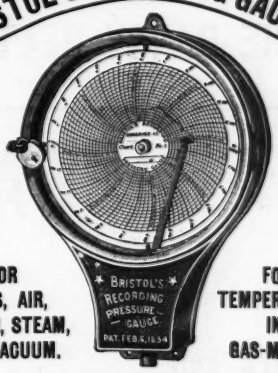

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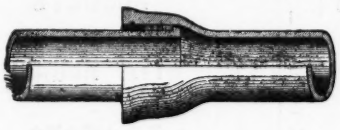

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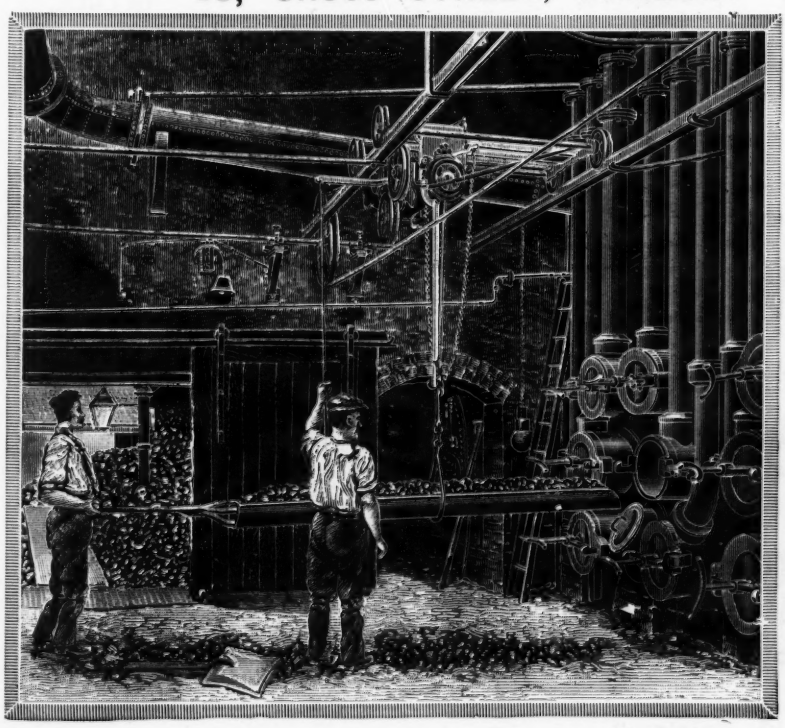

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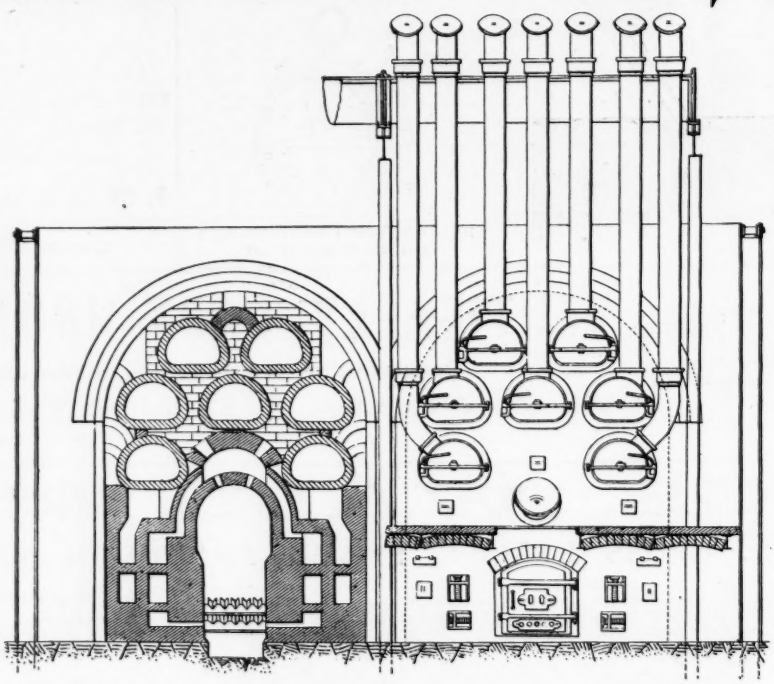

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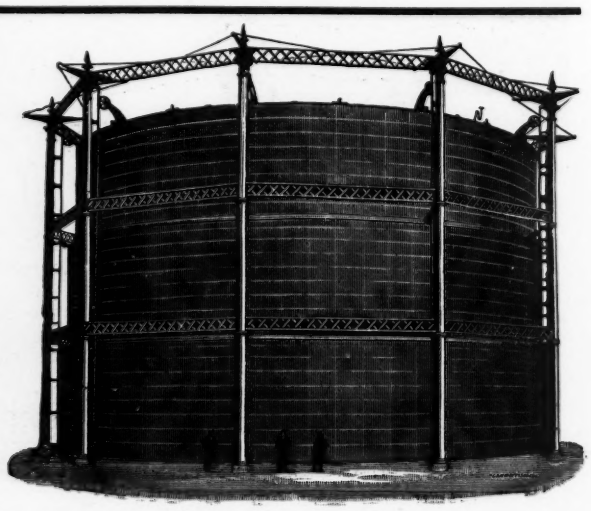

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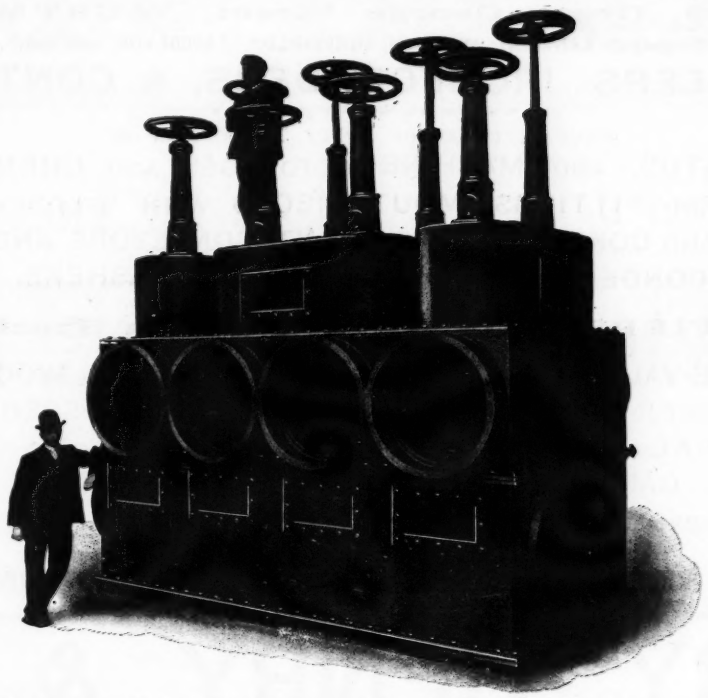

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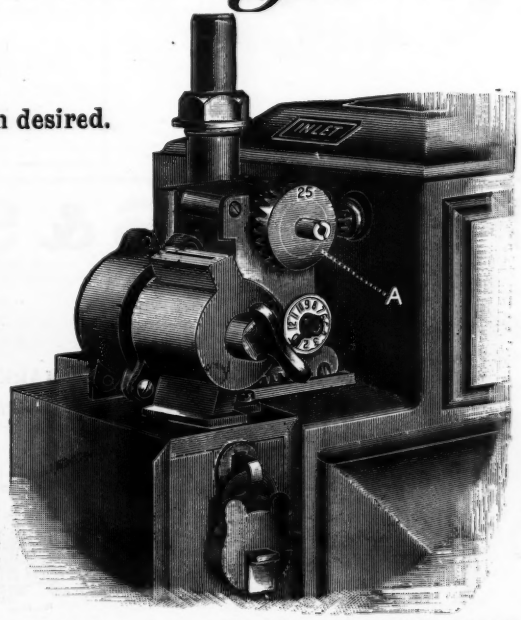

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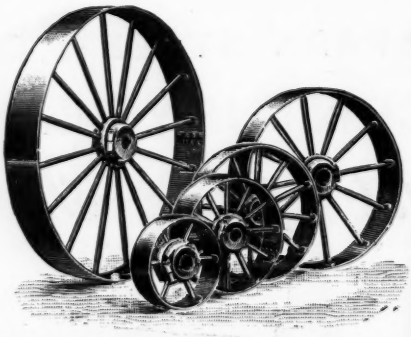

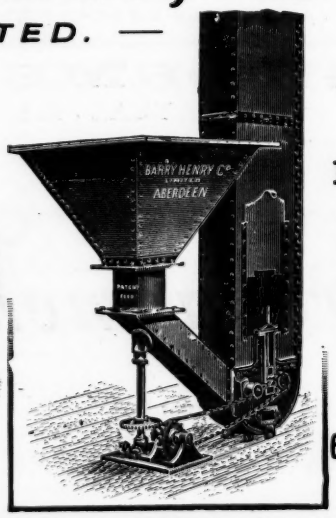

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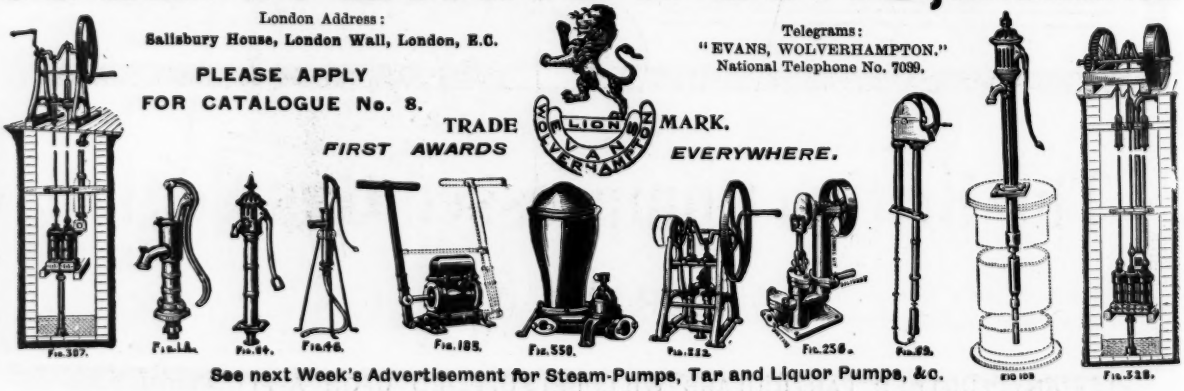

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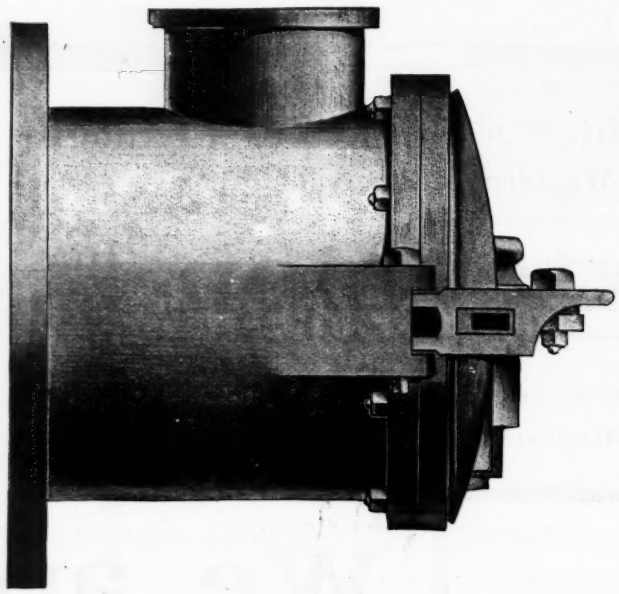

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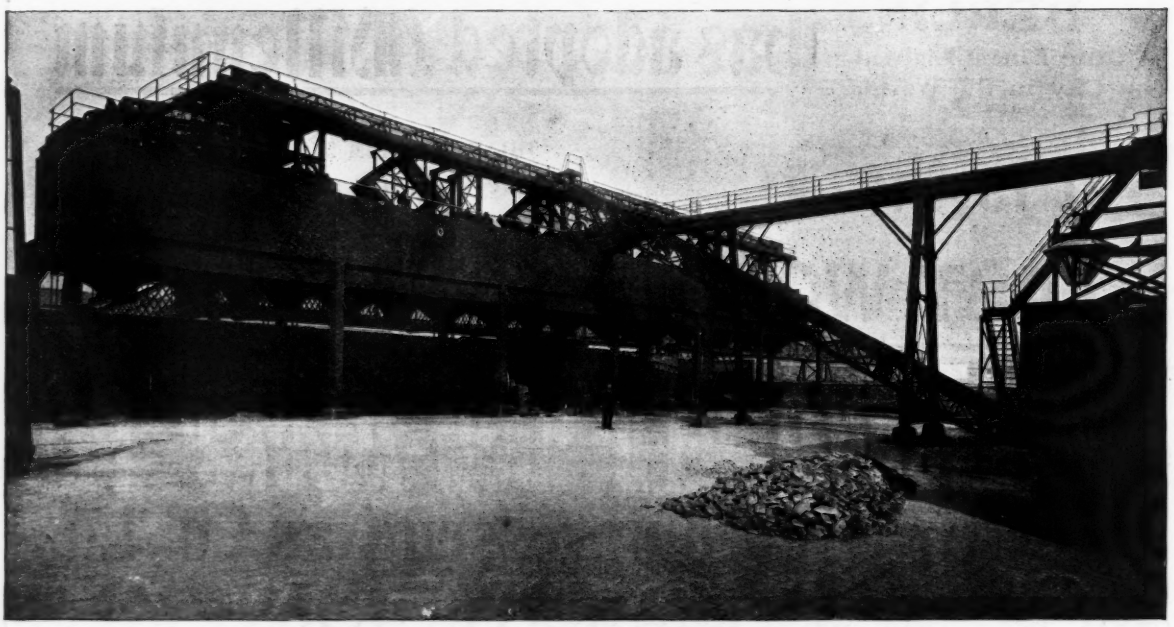

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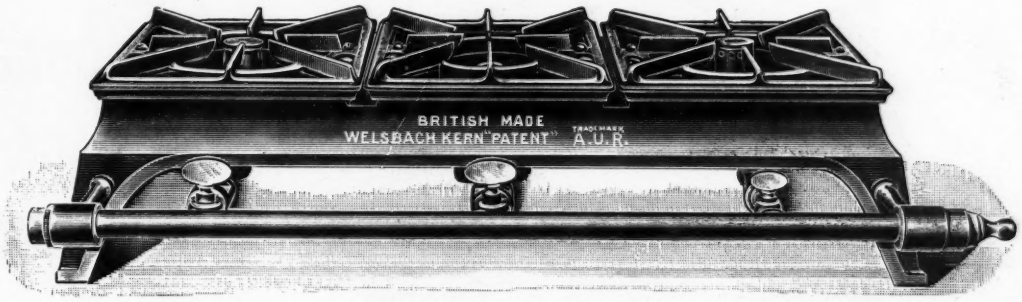
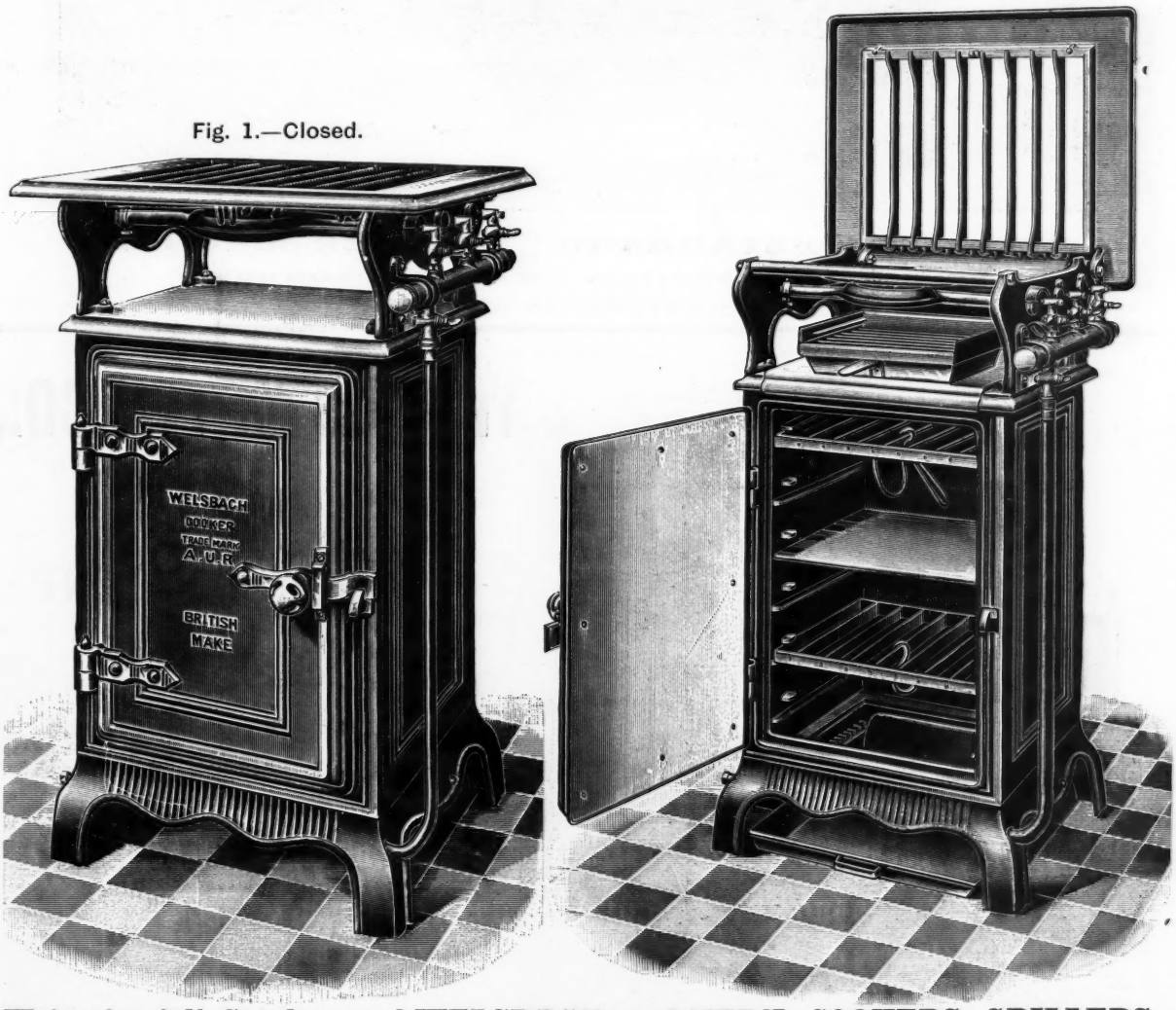


Fig. 2.—Open.

Fig. 1.—Closed.



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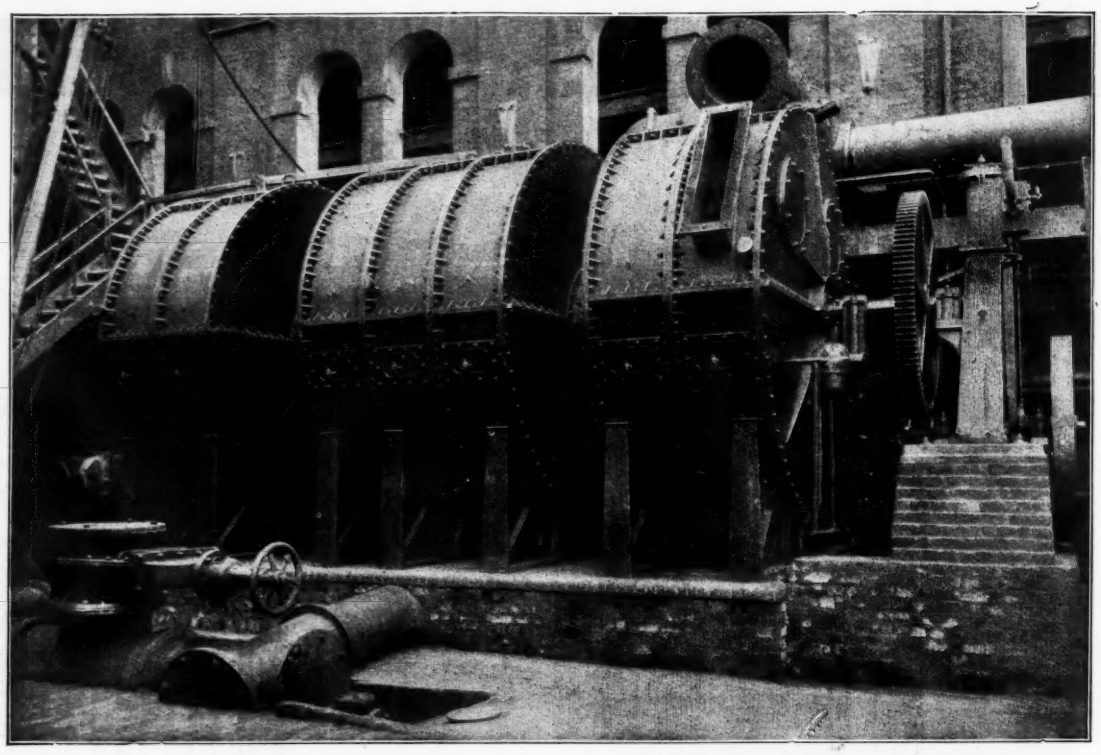

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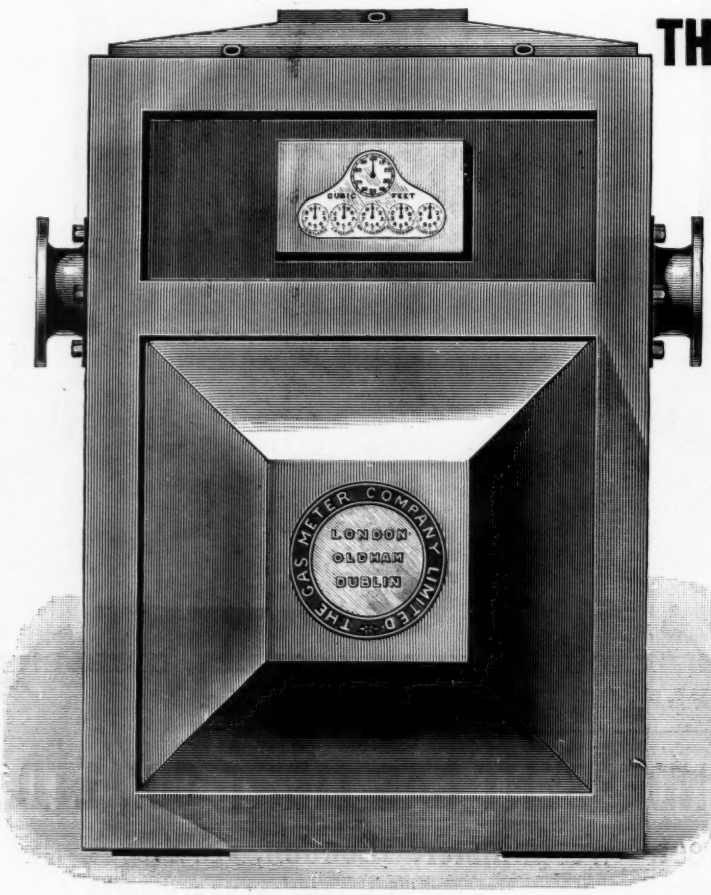

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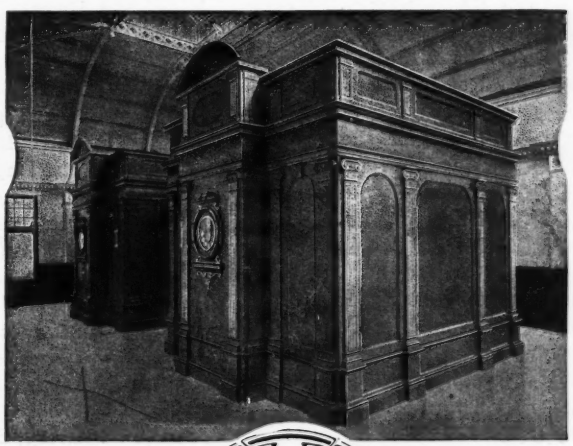

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Liverpool	3,500,000	Guildford	350,000	Southampton	800,000
Liverpool (Second)	4,500,000	Brentford	1,200,000	Hartlepool	750,000
Tottenham	750,000	Syracuse, N.Y.	850,000	Utrecht	1,000,000
Tottenham (Second)	750,000	Bridlington	150,000	Deventer	150,000
Santiago de Cuba	400,000	Middlesbrough	1,250,000	Portsmouth	1,000,000
Swansea	750,000	Croydon	1,250,000	Bournemouth	1,000,000
Manchester	3,500,000	L. & N.W. Rly., Crewe	700,000	Aylesbury	150,000
Brighton	1,750,000	Taunton	225,000	Hamburg	1,750,000
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Longton	600,000	Redhill (Second)	300,000	Taunton (Second)	350,000
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St. Gallen	225,000	Rotterdam (Second)	1,500,000	Bournemouth (Second)	500,000
Colney Hatch	400,000	North Middlesex (Second)	200,000	Vienna	3,500,000
Dublin (Second)	2,000,000	Rotterdam (Third)	750,000	Maastricht	200,000
Birmingham	1,500,000	Merthyr Tydfil	300,000	Antwerp (Second)	1,000,000
Tunbridge Wells	1,000,000	Shanghai (Second)	225,000	Tottenham (Fifth)	1,000,000
Faversham	200,000	Magdeburg	1,400,000	The Hague (Second)	500,000
Staines	600,000	Posen (Second)	700,000	Hampton Court	500,000
Commercial (Fourth)	2,000,000	Barrow	300,000	Lea Bridge (Third)	400,000
Southampton (Second)	500,000	Reichenberg	200,000	Dublin (Third)	650,000
Liége	1,000,000	West Ham	1,500,000	North Middlesex (Third)	75,000
Hebden Bridge	200,000	Deventer (Second)	200,000	St. Gallen (Second)	225,000
Chorley	300,000	Bremen (Second)	950,000	St. Josse, Brussels	1,000,000
Stafford	500,000	Malta	400,000	Dundee	1,500,000
Bridlington (Second)	200,000	Croydon (Third)	625,000	Bridgwater	200,000
Beckton (Second)	10,750,000	Tilburg	400,000	West Ham (Second)	800,000
Tottenham (Fourth)	1,000,000	Ostend	100,000	Brieg, Silesia	100,000
Gosport	200,000	Zwolle	200,000	Brussels—Ville (Fourth)	350,000
Brussels—Ville (Third)	1,500,000	Utrecht (Second)	1,000,000	Innsbruck, Austria	200,000
Swansea (Second)	1,000,000	Port Elizabeth	400,000	Marlborough	100,000

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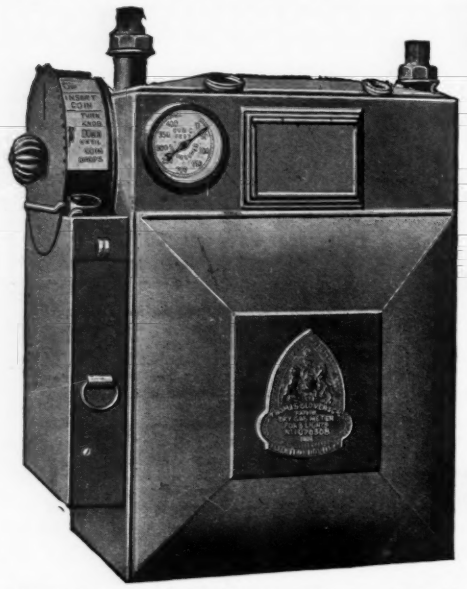

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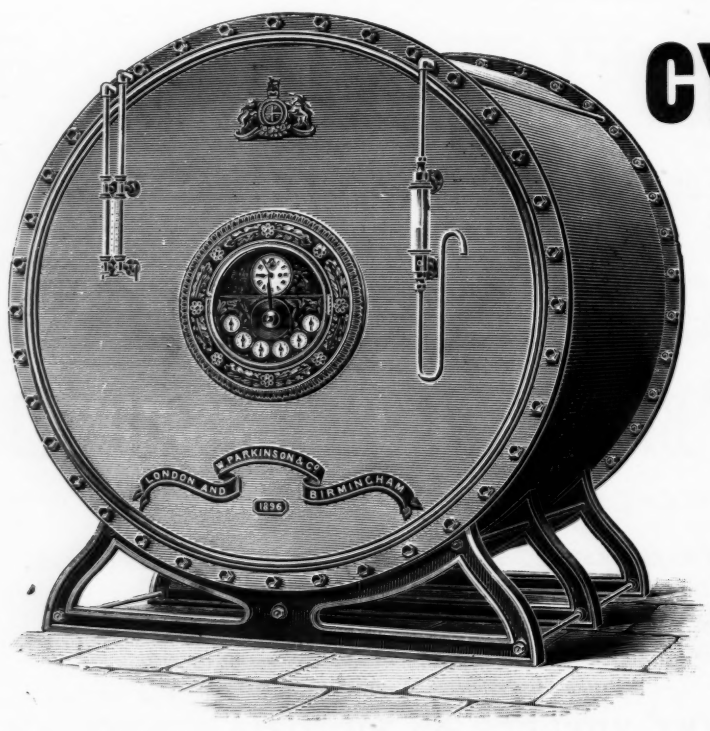

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EDITORIAL NOTES—GAS, &c.

The Programme for the Institution Meeting.

IN last week's "JOURNAL" there appeared the first public intimation of the character of the arrangements made by the President—Mr. H. E. Jones—and the Council of the Institution of Gas Engineers for the annual meeting, which will be held next week at the Institution of Mechanical Engineers. The full and final particulars are by this time in the hands of the members; and there is no doubt whatever that, in their judgment, the programme will be esteemed sufficiently attractive to secure that good attendance and hearty co-operation of the general body of the profession, from all parts of the kingdom, which is alone required to make the gathering completely successful. We were able to give last week a general forecast of the technical part of the programme; and this, practically speaking, holds good. The list of papers is adequate, and gives every promise of eliciting lively and instructive discussions on the chief subjects of pressing importance to gas engineers. With regard to the lecture by Professor Harold B. Dixon, which will be taken first on the Wednesday morning, it may be safely said that those who hear it will depart with a knowledge of the mechanism of combustion which will serve them well for the remainder of their lives. Professor Dixon has made this subject his own, and he is therefore able to give that first-hand information respecting his speciality which cannot be obtained in any other way than from the living word of the master.

It has been left to the last to mention the initial attraction of the meeting—the Presidential Address. As to what may be expected from Mr. Jones, it is happily unnecessary to deal in vague hypothesis. A leader of the gas engineering profession of his quality could not fail to be instructive if he tried, so long as he spoke of his own experiences. As a matter of fact, Mr. Jones is not merely full of the knowledge of things new and old which comes to a man of his life-long work in gas, but he possesses, as a gift of Nature, the power of happy expression which can make even the driest topics interesting. His address, therefore, cannot be dull, and it must be good. Finally, the President has undertaken to give, with Miss Jones, a reception and dance at the Hotel Cecil, which is certain to be a brilliant and enjoyable function. The excursion on Friday, to Arundel, is a happy arrangement, the locality being one of the most interesting and picturesque on the South Coast. Mr. Jones has rendered his presidency memorable by generously presenting a gold medal, to be given annually for the next seven years, as the first premium for communications to the Proceedings. It is a gift worthy of the donor; and the announcement will be received with all the warmth of acknowledgment which so handsome a benefaction to the Institution merits.

From the Granton Wages Book.

FOR months past, here and there in professional circles, there have been whisperings that before long there would be some surprising revelations from Edinburgh that would not be altogether creditable to the Granton inclined retort working in respect of manufacturing costs. Any tangible ground for these ominous predictions we have never been able to discover, and therefore have been driven to the conclusion that they were nothing more than the worthless imaginings, or (may it not be said ?) the ill-natured hopes, of certain of those who are inimical to the inclined system of carbonization. The "revelations" have now come, and from Mr. W. R. Herring himself, in response to an invitation some time since, and in compliance with a promise then made on his part. They take the form of an analysis of the manufacturing costs and charges for a complete year ending on the 15th inst.; and if due regard is paid to the conditions of working during the year at Granton, and care is taken in mastering what the totals comprise, as set out item by item, the figures should silence for the future those critics whose assertions are now proved to have had nothing better than illusion beneath them for support.

We are not going to indulge in any comparative or other examination of the figures; they are presented in another part of the "JOURNAL" (p. 566) with a fulness of detail that will permit every gas engineer to set his own corresponding figures side by side with Mr. Herring's items, and so make comparison for himself. If there is any further information required, or any criticism to make, no one will be more happy to give explanation or meet the criticism than Mr. Herring. There are, however, a few points which we may emphasize, in order that no mistake may be made, and, further, in order that the Granton variations from the general methods of keeping such working accounts as these may be marked and borne in mind. It must, in the first place, be remembered that there have been several things at Granton which have thwarted the realization of ultimate results, or results such as the Engineer looks upon as "ideal" or "final." Labour has been not quite satisfied with its conditions, the character of the work has been entirely new and strange to the majority of the operatives and foremen, and there have been the troubles to encounter which are always inseparable from the first stages of the operation of a manufacturing works of such magnitude as these, and constituted of such a number of moving parts. Taking these several things into account, Mr. Herring is fully justified in hoping to further reduce the figures that he gives in his analysis. But there are three other points which readers should particularly mark in considering the figures. The first is that none of the items in any way connected with the manufacturing operations are charged to what is commonly termed the repairs and maintenance account; secondly, that none of the items of expenditure strictly connected with the manufacture is debited against the residual products (coke in particular), as is so often done; and, thirdly, that at Edinburgh the expenditure in connection with the discharging or the handling of coal prior to the commencement of carbonizing operations is not charged to coal as is done in most other gas-works in accordance with the model form of accounts. The Edinburgh method is, of course, in agreement with Mr. Herring's contention of two years since, that a statement of carbonizing costs should comprehend everything from, and including, the unloading of the coal to the depositing of the coke and ashes in the yard.

Taken on this basis, the Granton figures for the past year, under the circumstances existing there, worked out to 1·482d. per 1000 cubic feet of gas made, or 15·47d. per ton of coal carbonized. Dipping further into the analysis and including purification, exhauster, washer, boiler, and other attendants, and in fact everything excepting repair to plant and labour on coke and residual products, the entire manufacturing costs are found to be 2·658d. per 1000 cubic feet of gas made, or 27·75d. per ton of coal carbonized. Now these are figures that are unequalled in lowness in the last issue of "Field's Analysis"—remembering, of course, that the figures in the "Analysis" are at per 1000 cubic feet of gas sold. Lower ones have been heard of in discussion; but these do not always appear to be supported when the annual accounts are analyzed. The least that can be done is to express felicitation to Mr. Herring on his showing from this early working. Over it, he is very modest. He does not display pleasure or satisfaction; but he does take us into his confidence to the extent of saying that, under the circumstances, he does not regard the figures as "by any means ideal or "final." One is left wondering as to what standard he has set for manufacturing costs and charges to which he applies the descriptions of "ideal" and "final."

It must be reiterated that it is no use taking Mr. Herring's totals and setting the totals of working in other places side by side with them unless the several items composing the totals are on all-fours with those of Granton. With Mr. Herring, we regret that nothing has been done to formulate a basis upon which the items representing the carbonizing costs should be stated, in order to assist in the making of useful comparison. We may take it that in his present

analysis, he gives what he conceives to be the proper form in which to render such statements. It is certainly comprehensive; and if in future discussion it is taken as a model, we shall then know where we are, and shall arrive at figures that are more valuable than those which have not been founded on any common system, and therefore have not been comparable.

Sound Municipal Finance at Bolton.

About six months since—to be exact, in the latter part of November, 1903—we had a little controversy in these columns, short and to the point, concerning the subject of the depreciation of Corporation industrial property, with the Chairman of the Edinburgh Corporation Electric Lighting Committee and the Chairman of the Electricity Supply Committee of the Bolton Corporation. The discussion arose over the assertion, made on general grounds, that municipal corporations do not provide sufficiently for the natural depreciation of their electric lighting plant, and are therefore able to compete at an unfair advantage with gas undertakings, which are almost without exception properly financed in this respect. The impeachment was strongly repelled, with regard to both Edinburgh and Bolton; and Dr. Panton, the Chairman of the Bolton Electricity Supply Committee, wrote a letter to the "Journal," in which he maintained the point that the practice of his Committee in this respect is correct, adequate, and just. Evidently bearing this controversy in remembrance, the Bolton authorities have sent on copies of their last year's tramways accounts, and of an abstract of the accounts of the Electricity Department, which we hereby acknowledge, with thanks. It is always a satisfactory way of clearing up a disputed question to hear the sequel. In this connection, therefore, it is only due to the Bolton Corporation to admit, in the most candid spirit, that their principles and practice in regard to electricity supply finance are unexceptionable. Whether or not this Corporation are more virtuous, as regards finance, than any other municipality engaged in trade, would be a delicate question to answer, if it were put. It is enough, however, to admit that they show an excellent example to all other local authorities. Perhaps this is partly to be explained by their exceeding prosperity. Wealthy men are usually respectable in business; and probably, if more local bodies were as successful in trade as Bolton, there would be fewer complaints of unfair municipal trading.

This is not the proper place for a detailed examination of the Bolton electricity accounts, and it must be reserved for another opportunity; but the immediate purpose of this notice is served by recording that both the Tramways and the Electricity Supply Committee charge their revenue accounts with depreciation on a scale which they are doubtless advised is reasonable. Machinery, mains, and transformers are charged at 6 per cent.; accumulators, meters, motors, and instruments, at 10 per cent. Altogether, the tramways are charged a total for depreciation of £25,886 for the past year; and the electricity supply works £10,868. These are first charges on the revenue. Out of them comes the payment on account of the sinking fund; and the balance either goes for renewals or is held in suspense. This appears to be sound finance, against which not the smallest objection of principle can be raised. Bolton, let it be confessed at once and without reserve, is a model of financial rectitude. Depreciation is not a bogey, nor is it a point of the pedantry of accountancy which over-scrupulous auditors may insist upon, or others more lenient pass over at will. It merely means charging the business with the cost of preserving its assets in revenue-earning order. As such, it can never be identified with the sinking fund for loan repayment, unless the latter very much anticipates the duration of the asset upon which it has been expended. Originally, as everyone knows, the length of the period allowed for the repayment of municipal trading loans was irrespective of the expectation of the life of the asset. The two conditions have latterly been harmonized; but it has never been accepted by any financial authority that so long as the loan was repaid the asset might be permitted to perish. This is merely to say that adequate depreciation is greater than the allocation required to repay the loan, even where the latter is limited in period to the expected life of the asset. For less than this period, no loan has yet been sanctioned. It appears to us that the Bolton practice is as fair as it is simple. First ascertain what is the reasonable charge for depreciation, then pay sinking fund out of it—using the balance that remains for the purpose of keeping up the value of the asset. It is perfectly clear. It is a matter of detail that in the particular case of the Bolton property, last year's proportion of loan interest to depreciation was as 6 to 11. Bolton is to be congratulated on having the means of doing this, and more; for a handsome subsidy remained for the rates. Assuming, for the particular purpose of defining the condition of perfect solvency, on the Bolton principle, that the subsidy to the rates did not exist, it would be a safe rule to lay down that the net disposable profit ought to be thrice the amount of the interest on loans. It will be well to bear this useful generalization in mind.

More Criticism of the Valuation Bill.

As time passes, criticism of the Government Valuation Bill grows more vehement. Several mercantile associations have given voice to their opinions respecting this innocent-looking measure; and, as we expected, the ostentatious way in which it has been puffed by the Chairman of the London County Council is met with vigorous protests against the prominence assigned to this body in the draft Bill. It is almost sufficient that the London County Council approve of a project of legislation, for every other interested party to fly to arms against it. The great objection raised to the Bill by mercantile criticism lies in the proposal to make municipal authorities, whether engaged in trade or not, the valuation authorities for their own districts. It is felt that this will be too great a temptation for these bodies to lay grievous assessments upon their trade rivals, while letting themselves off too easily. It is right that the notice of the Government should be directed to this possible danger, if the point has escaped their attention. We doubt, however, whether a matter of so much importance can have been overlooked; but, in any case, no harm will be done by inviting Government explanation of the reason for the plan. Another fault that is found with the measure is the lack of any provision against the abuse of paying professional valuers by results.

The most formidable opposition to the Bill comes, however, from the representatives of the condemned assessment committees. The Corporation of London are organizing a great City meeting of protest against the proposed disestablishment of the ancient parochial rating authorities; and probably every member of the 600 Assessment Committees of the land is against the Government on the presumption of the inutility of these bodies. The reply to this agitation will most likely be a polite reference to the report of the Royal Commission, coupled with a word or two on the past performances of the committees. If their work had been well done, no mere academic preference for another system would have had any weight with the Government or with Parliament. The work, on the contrary, has not been done properly; but great partiality has been shown in some cases, and neglect in several others. This consideration should really also be remembered by those representatives of the commercial critics of the proposed alteration who dread falling into the hands of valuation authorities in trade for themselves. Has the existing system been free from reproach? Because, if not, it will be futile to meet the Government plan with a bald negative. What arrangement would be preferable? It must be further remembered that the day of *ad hoc* public bodies is past. Overseers and assessment committees represent a type of administrative machinery which has become old fashioned. The ruling principle at present is to pile every executive responsibility upon the one elective body—the local authority—which has some claim to directly represent popular feeling. This may be a mistake; but at least the truth must be experimentally proved. The strength of fashion in these matters is enough to overbear all detail considerations; and one feels that what is wanted in the present connection is not particular criticism of the Valuation Bill, but an alternative suggestion. Failing the latter, a Parliament that has sacrificed school boards without remorse will probably dismiss assessment committees and overseers without regret.

A Bill to Amend the Alkali Works Acts.

A new Alkali Works Bill was produced by the Government just before the Whitsuntide recess; and it awaits consideration by Parliament. It contains numerous amendments of substance in the existing law, and will doubtless

attract some criticism from interested persons. The first part of the Bill relates entirely to alkali works. The second part deals with chemical works generally, in which list is included sulphate of ammonia works and also "gas liquor "works"—the latter being a fresh addition. They are not sulphate nor muriate of ammonia works, but those in which sulphuretted hydrogen or any other noxious or offensive gas is evolved by the use of ammoniacal liquor in any manufacturing process, and works in which any such liquor is desulphurized by the application of heat in any process connected with the purification of gas. Tar-works are also included, by a rather noteworthy description, in which the words "or "coal tar" are added to "gas tar," already listed. Such works are those in which tar is distilled or heated in any manufacturing process. This would embrace the smallest tar pavement works. The owner of any specified works is to use the best practicable means for preventing the "escape" of noxious or offensive gases, and for rendering the discharge of such gases harmless and inoffensive. Inspectors are to inquire whether the discharge of noxious gases from cement works can be prevented. Where it appears to the Local Government Board that such means of prevention can be adopted at reasonable expense, an order to this effect may be issued. All scheduled works are to be registered, and a stamp duty of £3 paid in respect of them. There is a provision enabling the Local Government Board to dispense with some rather onerous conditions as to equipment, in the case of old-established works; but apparently all works, whether large or small, must pay the registration fee. This appears to be hard on such small affairs as many tar-paving yards. Provision is to be made for the appointment of local inspectors at the request of sanitary authorities. In some cases of offence under the Act, the owner of works may escape conviction if the offence was committed, without his knowledge or consent, by an agent or workman. Complaints of nuisances may be preferred by the sanitary authorities. "Fumes from tar-works" are listed as noxious or offensive gases. The expression the "best practicable "means," where used with respect to the prevention and escape of noxious and offensive gases, has reference not only to the provision and the efficient maintenance of appliances adequate for preventing such escape, but also to the manner in which such appliances are used, and to the proper supervision, by the owner, of any operation in which such gases are evolved.

Foreign Patentees and English Jurisdiction.

THE character of the "Editorial Notes" in the last issue of the "JOURNAL" might suggest in the minds of our readers the reflection that important law cases more or less closely affecting the gas industry, like misfortunes, do not come singly. It is a curious circumstance, that whereas for some time past our comments and observations have had little to do with law, there is suddenly a batch of legal cases to occupy attention. The last, however, that need be mentioned is of a somewhat peculiar nature. It is only inferentially a gas case, inasmuch as the subject-matter is a question of the length of the arm of English law, and whether it can be extended to bring foreigners within the jurisdiction of English Courts. The House of Lords have just decided that this can be done. The decision is of some moment to an industry of so international a range as that of gas manufacture, and particularly in respect to the incandescent mantle branch, in which questions of international patent right are so liable to occur. In the case in point, moreover, both the parties are engaged in that industry of coal-tar dyes and drugs manufacture which has so melancholy an interest for all the friends of British enterprise. Having succeeded in almost monopolizing the trade in coal-tar derivatives, the Germans just now find themselves face to face with a strenuous competition by Swiss firms—the battle-ground for both being the English market. Consequently, a German firm instituted in England an action against their Swiss rivals, charging the latter with infringing their (English) patent—a patent, be it observed, which is worked in Germany, and only the products of the manufacture vended here!

In no other country on the face of the globe could such an action as this be brought. Those who, under cover of an English patent, have invaded our market with a speciality of which they take the whole profit back to Germany, now seek the protection of our hospitable Courts against other invaders whom they, the first contingent, regard as pirates. And the Courts have listened to their prayer. It was the well-known Badische Anilin und Soda Fabrik, who had an English patent for an invention in the way of basic dyestuffs, which they contended was infringed by the Chemische Fabrik (vormals Sandoz) in Basel. The latter had come into the English market with samples, pattern-cards, and agents, and had thereby obtained orders, which seem to have constituted the overt acts relied upon as evidence of infringement. Cognizance was taken of these proceedings, and Mr. Justice Joyce was successfully moved to issue a writ against the alleged infringers, for service out of the jurisdiction, which was duly performed at their place of business in Basel. Later, however, the defendants thought better of it; for, after having caused a conditional appearance to be entered for them, they moved to set aside the writ and service. This was carried up to the House of Lords, who have decided that the writ and service must stand. A curious point will apparently have to be disposed of at the trial—as to whether the fact of the use of agents, samples, and patterns is or is not of importance, as elements of the act of infringement. So much seems to be contended; while the other side deny it. The net result of this contention would therefore seem to be, that where an infringer does not himself solicit trade in the speciality that is patented, there is nothing for the law to act upon. If this means that a British buyer of foreign gas-mantles or dyes can get supplied with infringing goods from abroad, so long as he does not deal with an agent, it will raise many questions. These difficulties respecting foreign patentees have always proved troublesome. It is only the value of the English market for his trade that can induce a foreign patentee, residing out of the jurisdiction, to submit to the English Courts at all.

The Settle-Padfield Retort-Setting.

Some delay has been occasioned in obtaining results from the bed of six Settle-Padfield retorts at the Exeter Gas-Works, owing to a structural defect in the lower portion of the setting, which caused the upper parts of the retorts to be at a greater temperature than was necessary, while the lower parts were heated very indifferently—an experience altogether foreign to anything found in the original experimental setting of one retort. It has got bruited abroad that the setting has failed. This, we are assured by Mr. Settle, is a mistake. Nothing whatever is wrong with the patent part of the setting; and it is only a question of rebuilding the lower part, owing to the structural error in the first instance. Contractors are now engaged on the reconstruction work; and it is being pressed forward as rapidly as possible. It is necessary to make this explanation, in view of the rumour that has obtained circulation, and which rumour, it will be seen from the foregoing statement, is purely the product of imagination, seeing that the bench has not yet been in a condition to test the process. Directly the re-setting of the lower part has been finished, the bench will be put under slow fire; and, immediately it is ready, working will commence, and the results be made known.

Coal and Water Gas from Vertical Retorts.

It was in August last year that we first heard that the German Continental Gas Company and Dr. Bueb had developed their vertical retort system to the extent of utilizing the incandescent charge (after the yield of gas began to decrease) by introducing steam, and so realizing a further yield in the form of water gas. It was in August last, too—on the 25th—that the "JOURNAL" published the specifications of certain American patents taken out by Charles W. Isbell between Feb. 11 and Aug. 26, 1902, in which like, or very similar, proposals were made. Last week the patent specification of the German combination plan was issued (see p. 579); and this is dated July 8, 1903—more than ten months later than the date of Isbell's final specification. Now, however, that the German specification is published, we are compelled to confess to a feeling of disappointment. Whether it is the want of illustrations or an insufficiency of description of the German process, we cannot say, but the fact remains that the most microscopical examination of the description given in this specification does not disclose anything that strikes us, after having read Isbell's patents of 1902, as being particularly new. In the last paragraph of the specification, it is said that "the essence of this

invention does not merely consist in the use of such [vertical] retorts, but in the hereinbefore described two-stage gasifying operation in such vertical retorts." Turning to Isbell's American patent, dated Feb. 11, 1902, we find these words: "Steam or air is admitted from the chamber to the retort . . . *after all the gas has been distilled from the coal in the retort and only coke is left;*" and in the same inventor's patent of Aug. 26, 1902, are these words: "For the purpose of loosening the coke from the retort, *after all (or as much as is desirable) gas suitable for illumination has been obtained from it*, the proposal is to introduce into the retorts . . . steam, preferably superheated, for the purpose of producing the decomposition or combustion and conversion into gas——" If the description of "a two-stage gasifying operation in vertical retorts" does not apply to these proposals, then we do not know what "a two-stage gasifying operation" means. This is not a suggestion of any such ugly thing as piracy; but it certainly does look as though Dr. Bueb and his colleagues have alighted on the same track that Isbell found some months before them. The view may be a mistaken one; but perhaps Dr. Bueb will throw some light on the matter by explaining wherein are the differences between his proposals and those of Isbell.

Dear Loans

As was anticipated would be the case, the great success which attended the recent London County Council loan has tempted a good many other authorities to try their luck in the same way. The number of times that the County Council loan and the more recent Japanese loan were subscribed, would seem to indicate that there must be large sums of money waiting investment; and to this extent at least the time for making new issues is opportune—at any rate, for the first in the field. From the beginning that has been made, it is fairly safe to assume that, if the municipalities have their way, there will very shortly be such another glut in the market for this class of security as was recently experienced. The London County Council secured their success by the offering of tempting terms to investors; and those who have followed in their wake have mostly deemed it expedient to hold out even greater inducements. The London County Council made their issue of 3 per cent. stock at 90; while Croydon have fixed their figure at 88½, and West Ham at—84! The Surrey County Council, on the other hand, have felt themselves in a position to offer a not very big amount of stock, bearing the same rate of interest, at the comparatively satisfactory price of 92. West Ham has in times past secured unenviable notoriety in respect of the high rates levied there; and one cannot help wondering what inhabitants will think of the terms on which their representatives are willing to incur still further indebtedness—with what success remains to be seen.

And Some Distinctions.

But whatever may be the opinion of the ratepayers on the matter, it is, as the "Financial Times" points out, worthy of remark that within the space of a week there should have been three issues of a municipal character, all being securities of the trustee class, presumably undeniable, and bearing the same rate of interest, put on the market at 84, 88½, and 92 per cent. respectively. There is nothing in the dates of redemption or in the immediate concessions as to interest which would account for these discrepancies; while as regards marketability, the Surrey County Council issue, which is the dearest of the lot, should, other things being equal, be at a disadvantage, as being by far the smallest loan of the three. The extraordinary difference between the highest and lowest issue prices of these loans, makes it appear to our contemporary as if a distinction in credit were beginning to be established, or, in other words, as if certain municipal stocks, though bearing the hall-mark of the trustee stamp, were coming to be regarded as more speculative than others; and colour is, it must be admitted, lent to this view when it is considered that the Municipality which has imposed the greatest strain upon the ratepayers is the one whose stock is put on the market at the lowest price. Taking all the circumstances into account, it is comforting to be able to reflect that, if the ratepayers themselves are powerless to resist the pledging of their credit to any extent, the Money Market can, and no doubt will, take care that too great encouragement to extravagance is not given to local governing bodies.

The "Daily News" Compares Electric Light with Gas.

A strange and remarkable commentary on the competition between gas and electric lighting recently appeared in the exclusive columns of the newspaper which humbly takes to itself the qualification of being "London's Best." It might be gathered from this lucubration that a London newspaper has so much to occupy its attention, that it has only just discovered how "in Southwark and other boroughs the incandescent mantle is helping the gas companies to arrest, temporarily at least, further inroads into their street lighting business." Southwark, quotha! Contemplation of the condition of the artificial light trades in this particular Metropolitan Borough leads our great and good daily contemporary, which does not encourage the prophets of the Turf, to "foresee that before many years gas will enter upon a life and death struggle, both as an illuminant and as a heating power." One wonders what has been going on these twenty years. By way of pointing the moral and adorning the tale, a set of comparisons of the cost at which the residents in different parts of London can obtain electricity and gas is set out, on the simple rule of taking "electricity at 6d. per unit as practically equal to gas at 3s. per 1000 cubic feet." The beauty of this comparison consists in its being used indiscriminately for all applications of gas and electricity—for lighting without distinction of the kind of lamp; for motive power; and, for all that is said, for warming and cooking also. It might have been thought that even a writer for the "Daily News" would have known that the results of employing electricity in an arc lamp, a Nernst lamp, and an ordinary incandescent lamp are all different; and that there is no natural and necessary connection between the performances of electric lamps and electric motors. Similarly, those citizens of London who are yet contented to go on paying gas bills might be supposed to know that the relative efficiency of a means of using a necessary of life, to some other means, is of at least as much importance as the invoice price of the supply. But this is the weakness of the usual newspaper references to matters of every-day life and business. Comparison of costs of different things are idle, when the conditions of use are neglected in each case. Where the conditions ignored are of such importance as whether arc or incandescent electric light or flat-flame or incandescent gas light is in question, it would seem that any professional prophet who looks for the downfall of gas by reason of such lame comparisons had better wrap himself up in his property mantle, and go to sleep until he is called to see the verification of his forecast.

Strange Experiences.

Readers of the reports of the meetings of Gas Companies carrying on their operations in places far distant from this country often meet with experiences which do not fall in the way of the gas manager in this country. One was brought to notice in the course of the proceedings at the meeting of the South African Lighting Association, as reported last week. It is usually very easy for a manager in this country to account for any little shrinkage in the gas consumption—unfavourable atmospheric conditions, the closing down of business establishments, short working time at factories, and so on, supplying good and sound reasons. But never in this country has a gas manager been able to say that a decrease in gas consumption was due to the setting on of the hands of the clock by an hour. That was the explanation—and a satisfactory one too—given by Mr. D. Ford Goddard, M.P., when presiding at the meeting of the Association in question, for a little diminution in the gas consumption during the latter part of last year, compared with the same months of the previous year. It appears that in Cape Colony, time has been brought forward by an hour. For example, what was formerly six in the evening is now seven. But the change in time has not changed the regulation by the clock of the habits of the people. They close their offices, shut up their shops and other business establishments, and retire to bed an hour earlier than they did before, because the hands of the clock point to the hour being the same. And so in all these directions the Company have, of course, lost that hour's consumption, and obviously they do not make it up by the people rising or commencing business an hour earlier. This simple fact shows that, even if no other advantage has followed the change in time in South Africa, it has benefited the people by producing an economy in artificial lighting—in other words, they usefully employ an extra hour's daylight, to

the detriment to a small extent of the suppliers of artificial light. This surely is a unique experience. Again, in this week's issue is the report of the meeting of the Monte Video Gas Company. A revolution is one of the things that the Directors and Manager have to reckon with at the present time. It has rudely upset everything; and the Directors and officials do not look hopefully upon maintaining the level of the business this year. But that is not the end of the trouble so far as the Company's Manager is concerned. Conscription is now in force in the country; and though the Manager succeeded in getting the authorities to leave his men alone for a time, now that things have become darker, they have compelled the enrolment of some of the men for service. This is another unpleasant experience with which gas men in this country are unacquainted.

Begging for the Annual.

Once more we are invited to issue a protest against the system of begging for contributions from commercial firms connected with the gas industry towards defraying the expenses of the annual holidays or trips of gas-works employees. Our protests, which have been many, have been couched in language which it was hoped would have stirred up in those responsible for the sending out of these cadging communications a sense of the degradation which such action brings upon themselves and the undertaking with which they are connected. Last year we published the first begging letter sent to a firm of contractors, who in turn forwarded it to us. This year, as ordinary forms of protest do not avail, the same course is taken. In this instance, the circular-letter received (of which we have had copies from two different sources) emanates from Middleton, and is as follows:—

Gas-Works, Middleton, May 18, 1904.

Dear Sirs,—We beg respectfully to inform you that our 21st Annual Workmen's Trip takes place at an early date, and the place selected is Blackpool. They will be pleased to receive, through the Engineer and Manager (E. E. J. Anderson, Esq.), or the undersigned, any contribution you may be disposed to send towards making the outing an enjoyable one. Signed on behalf of the Workmen—Yours faithfully

ERNEST KENYON, Hon. Secretary.

So much has hitherto been written on this subject, that we will refrain on the present occasion from repeating our comments. It is a matter for satisfaction that the parties responsible for the sending out of the foregoing letter had the decency not to use the letter-paper of the Corporation of Middleton for the purpose, but typed it on mean, plain sheets of paper which well accord with such an appeal for alms. The Middleton Corporation will perhaps see that steps are taken to prevent the repetition of the indignity which is brought upon them by this system of begging for money from firms with whom they have business relations. Certainly Mr. Anderson, as Vice-President of the North of England Association of Gas Managers, should not allow his name to be mixed up with such an appeal.

WATER AFFAIRS.

Corporation Methods Criticized at Halifax.

THE inquiry held at Halifax last Thursday into an application made by the Corporation to the Local Government Board for their sanction to the borrowing of £86,765, mainly for the completion of the extensive reservoirs at Walshaw Dean, brought to light several features of Corporation management of a water undertaking which other authorities having the control of water-works will do well not to copy, if they wish to escape criticism by the ratepayers and a snubbing from the high officials at Whitehall. Whatever difference of opinion may exist as to the advisability of entrusting the management of gas-works, electricity supply stations, tramways, and similar concerns, to municipal authorities, the opinion is pretty generally held that the supply of water, being so closely bound up with the sanitation of towns, should not be in the hands of trading companies, but of the body responsible for the various branches of administrative work which make for the preservation of the public health. Admitting that the Local Authority are the right people to manage the water-works, it assuredly behoves them to discharge their duties in such a way as not to incur the censure of those whose interests they are supposed to conserve. This the Halifax Corporation do not seem to have done. In 1898 they went to Parliament with a scheme for the construction of some extensive reservoirs at Walshaw Dean, for which and for other works connected with water supply they obtained power to borrow £157,000. This was the sum put forward as the probable cost of the works. But what do we find? The expenditure has gradually increased until it has reached about £234,000, or £77,000 more than the amount originally applied for.

In view of this large increase, the ratepayers were naturally desirous of knowing whether the £86,765 would be likely to complete the scheme, as they objected to large supplementary estimates being brought forward; and they expressed to the Inspector (Colonel Slacke), through their Association, their views of the conduct of the Corporation in terms which occasionally were much too personal for him to allow. At the same time he could not close his eyes to the justness of some of the complaints. For instance, he was surprised to learn that the £157,000 had been based on estimates prepared in connection with powers applied for years before 1898, and never revised; and he thought it must have been perfectly evident that a much larger sum would be required. The Corporation ought, he said, to have asked for more money at the outset. This was the burden of the ratepayers' complaint—that a modest estimate was put forward for carrying out public works, the probable actual cost of which the Corporation were careful not to disclose, and then additions were gradually piled on. Of course, as the Corporation are committed to the scheme, it must be carried through, at whatever cost. But it seems questionable, from what transpired at the inquiry, whether inhabitants of the borough will derive as much benefit from it as those in the out-districts, who will not have to bear the cost. These places, however, have been brought by Parliament within the Corporation's limits of supply, and they must be served at the price fixed. Furthermore, houses and cottages are provided with bath water without extra charge. These are favourable points which the Chairman of the Water Committee (Mr. Parker) did not fail to bring before the Inspector. He likewise very properly defended the action of the Committee in afforesting their watershed area, on the ground that it would tend to ensure the purity of the water. In this and in certain other respects some outlay has been incurred without having any tangible return for it; just as when a water company lay out a large sum of money in extending their filter-beds. No one should complain of expenditure in this direction; and not very much was made of it at the inquiry. The principal charge brought against the Corporation was that they had embarked upon a large scheme of reservoirs upon inadequate estimates, and moreover had done so without making the preliminary trial borings which would in all probability have revealed their inadequacy. Such a proceeding is not commendable in a body entrusted with the spending of public money; and the Corporation were made aware of this from both sides of the table on Thursday. The lesson should be taken to heart by others who are tempted to follow their example.

The "Annalen für Gewerbe und Bauwesen" recently published a lecture given by Herr Thiem, at the meeting of the German Association of Mechanical Engineers, on air gas or carburetted gas, the use of which is daily increasing in Germany. The gas can be made with ether, benzol, alcohol, or light naphtha oils, which are powerful carburetting agents. After considering the properties of these liquids, the lecturer discussed the facility of their employment at different temperatures, from the point of view of their heating and lighting power. According to him, a gas composed of air and benzol giving 5000 calories would cost 8 pf. per cubic metre, or about 2s. 3d. per 1000 cubic feet, and compete with coal gas, alcohol, or acetylene in a number of instances. The delivery of the gas must be regulated according to temperature and the number of burners in use. Good regulators consist of meters which introduce a certain percentage of the carburetting agent for a given volume of air passing through the carburettor under the action of a fan. It is profitable to carburet the air when it is at low pressure and a relatively high temperature. Some generators are furnished with a small gas-holder bell which, as it rises and falls under the action of variable consumption, throws the fan into or out of gear, and automatically proportions production to demand. The air is subjected to a pressure of about 40-10ths. The gas thus produced and employed as a lighting gas is heavier than pure air, with which it mixes with difficulty. Its odour is not unpleasant, and suffices for the detection of leakages.

THE PROGRAMME FOR THE FORTHCOMING INSTITUTION MEETING.

The programme for the meeting of the Institution of Gas Engineers which was noticed in last week's issue, together with the annual report of the Council, has undergone a change in two particulars. Mr. W. G. Quicke, of Perth, Western Australia, has cabled to say that his paper will not be delivered in time for reading at the meeting; but we suggest that the Council, on receiving it, should permit its publication in the technical press, and not delay it until the issue of the volume of "Transactions" many months hence. However, the number of papers to be presented at the meeting will not suffer, as Mr. W. Sugg has sent in a communication on the subject of "The Lighting of Schools, &c."

From the Secretary (Mr. Walter T. Dunn) has come a synopsis of the lecture which Professor Harold B. Dixon is to deliver on the "Mechanism of Combustion." It is as follows: "Davy's experiments on flame; his explanation of the luminosity of hydrocarbon flames. Faraday's views—preferential combustion. Bunsen's discontinuous combustion. Experiments of Heumann and others on the action of the air admitted to a Bunsen burner. The two cones of the Bunsen flame. Professor Smithell's separator. The composition of the interconal gases, due to equilibrium. The lecturer's own experiments on the burning of carbonic oxide and cyanogen; the influence of aqueous vapour. The rapidity with which flame is propagated in mixtures of gases. Berthelot's l'onde explosive. The sound-wave hypothesis. How hydrocarbons are attacked in the flame. Professor Armstrong's theory of the formation and breaking down of additive compounds. Dr. Bone's experiments on slow combustion. How explosion-flames are propagated. The analysis of explosion-flames by photography. Work of Le Chatelier, von Oettingen, and the lecturer. Great influence of the mode of ignition and of the length of the column of gases. Complicated nature of the flame. Experiments on the temperature and pressure of explosion-flames." From this synopsis it is seen that the lecture is to be of a highly comprehensive character; and it promises to be equally instructive.

THE GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

Programme of the Forthcoming Annual General Meeting.

The Forty-Fourth Annual General Meeting of the Association will be held (as already announced) at Hanover from the 21st to the 25th prox., under the presidency of Herr Leonard Körting, the Engineer of the Imperial Continental Gas Association at Hanover. From the provisional programme, just to hand, we give the following summary of the arrangements for the meeting.

The local headquarters of the Association for the week will be at the "Tivoli." There will be an assembly on the evening of Tuesday, June 21, and those attending will be the guests of the Corporation of Hanover at a supper. The technical proceedings open the following morning at nine o'clock, and will claim the attention of members until midday on that day and the two succeeding days. On the afternoon of Wednesday, the 22nd, a circular drive has been arranged, with a visit to the town electricity supply works; and for the evening a concert and supper have been planned. The programme for Thursday, the 23rd, gives members the option of visiting in the afternoon either the works of the Hanover Engineering Company, or the works of Körting Brothers at Körtingsdorf—a suburb of Hanover. In the early evening, a visit to the gas-works of the Imperial Continental Gas Association, which are situated in the Glockseestrasse, has been arranged; and the Association have invited the visitors to supper there. At 5 o'clock on Friday, the 24th, there will be a banquet in the Hall of the Tivoli. For Saturday, the 25th, a choice must be made of one out of three whole-day excursions; the shortest being to a local iron-foundry, another to the oil-springs at Wietze, and the third (and longest) to the town of Hildesheim. A special programme has been prepared for the benefit of ladies during the morning hours of the three days on which the technical business of the meeting is in progress. Visitors will, as usual, be welcomed; and any one contemplating attending the meeting should notify the management of the Hanover Gas-Works at once.

With regard to the technical proceedings, it is intended to devote the 22nd to lighting topics, and the 23rd to water supply; while private business and arrears of papers from the two preceding days will occupy the 24th. The order in which the papers, &c., will be presented is not yet fixed; but the following is a list of the subjects which will be dealt with during the three days: "The Gas Supply of Hanover," by Herr Leonard Körting, the President of the Association and Manager of the Hanover Gas-Works; "The Municipal Electricity Supply Works of Hanover," by Herr Prücker, the Manager; "Researches on Gas Coals at the Municipal Gas-Works of Berlin," by Professor Drehschmidt, of Berlin; "The Lighting of School Rooms by Gas and Electric Light," by Dr. E. Schilling, of Munich; "Radium, with a Demonstration of its Properties," by Professor Runge, of Hanover; "The Development of the Professional Association for Gas and Water Works since 1885," by Herr Heidenreich, of Berlin; "Petroleum in Germany, and its Occurrence at Wietze," by Professor Hoyer, of Hanover; "The Water Supply of Hanover," by Herr A. Bock, the Manager of the water undertaking; "The Scheme of the New Steam-Boiler Law," by Herr E. Froitzheim, of Cologne; "The Gelsenkirchen Water Supply," by Herr E. Grahn, of Hanover; "The Hygienic Aspect of Water Supply," by Professor Gaertner, of Jena; "An Experimental Gas-Works," by Dr. H. Bunte, of Carlsruhe (the General Secretary of the Association); and "The Use of Gas Coke," by Herr Stack, the Heating Engineer to the Corporation of Hanover. The reports of the Committees appointed by the Association to investigate the following subjects will also be presented: (1) Photometry, (2) Heating, (3) Gas-Meters, (4) Gasholder Standardization, (5) Water Supply Statistics, (6) Standardization, (7) The Working of Water Undertakings, (8) Vagrant Electric Current, (9) Technical Instruction.

SOCIÉTÉ TECHNIQUE DE L'INDUSTRIE DU GAZ EN FRANCE.

Programme of the Forthcoming Meeting.

The programme of the French Gas Society's meeting—extending, as previously announced, from June 14 to 17 inclusive—has just been issued. There are in all 27 technical papers. M. Ad. Bouvier will describe the gas-works at Darmstadt. M. Parsy has three papers to his name—one on a bench of eight arches of nine inclined retorts 20 feet long (the first installation of its kind in France—at Nanterre, near Paris); another is called simply "Elevator-Charger;" while the third is "On the Recomposition of Hydrocarbons in the Retorts." A new discharging ram for either ended or through retorts will be brought to notice by M. Laurain. The measurement of high temperatures and the Féry pyrometer will be dealt with by M. Foiret, who also describes the Simmance-Abady photometer. M. Philippard will treat with condensation; and different types of purifiers will be considered by M. Jouanne, who also has a second paper on an incandescent burner with warm air current. Then there are contributions from MM. Rouget and Lacaze on the "Simplex" and "Constant" meters; and M. Lecomte's name figures against the titles of his customary trio of papers. Suction-producers also meet with attention, as well as gas-engines, new intensive burners and their general progress (by M. Denayrouze), and automatic lighting of public lamps (by M. Casaubon).

These are some of the subjects dealt with; and it is evident that the proceedings will be full of interest. Among the visits, is one to La Villette works, to see the electric turbine charger and discharging ram, and another to the Nanterre new gas-works previously mentioned, where there are inclined retorts and a complete system of labour-saving appliances. A busy and successful annual meeting seems assured.

Separation of Gases by Centrifugal Force.—In the "Zeitschrift für angewandte Chemie," Herren G. Bredig and F. Haber deal with the principles of the separation of gases by means of centrifugal force. After entering into a mathematical discussion of the physico-chemical principles underlying the problem, the authors arrive at the following conclusions: The centrifugal separation of air as proposed by V. Calzavara is impracticable, the circumferential velocity required in a single-stage separator being greater than any known material of construction can withstand. A multiple-stage separator is impracticable, as the chambers and shaft would have to be of enormous length in order to yield a sufficient quantity of air rich in oxygen. The energy required for the actual separation is small, but great losses are caused by friction in the bearings of the separator. All these difficulties are due to the circumstance that the difference in density of the gases to be separated is very small, and that the rate of diffusion of the two gases, on which depends the rate of production of a gas rich in oxygen, is also small.

Determining the Ignition-Point of Gases.—In the notice given on p. 436, of some of the exhibits at the recent *conversazione* of the Royal Society, brief reference was made to the apparatus shown by Professor Harold B. Dixon and Mr. G. W. A. Foster, for determining the ignition-point of gases. We have since learnt that it is constructed as follows: A wide tube of Jena glass, mounted vertically, is wrapped with asbestos, platinum foil, asbestos, and platinum wire, so as to serve as an electric furnace. Into this tube reaches a narrow glass tube, with an orifice on the top through which hydrogen escapes. Oxygen passes up in the annular space around the hydrogen tube. Just above the orifice is a Le Chatelier thermo-couple thinly covered with Jena glass. When the temperature has risen sufficiently high, the gas-jet ignites immediately on the couple. It should therefore be possible to get correct ignition temperatures, which are otherwise difficult to observe. The value found lies between 610° and 616° C.; while Mallard and Le Chatelier observed from 552° to 569° C., and Meyer and Krause from 516° to 600° C.

A CHAT ON DECIMAL CURRENCY AND THE METRIC SYSTEM.

Their Application to the Sale of Gas.

In an office in which all the workers think, breathe, move, and have their being in an atmosphere of decimal currencies and metric weights and measures, the writer had an interesting chat with the chief a few days since on, for some folk, the eternally absorbing subjects which constitute the aforesaid atmosphere. The chief in question is a cosmopolitan in the truest sense of the term; and his business life has been spent in dealing with all matters affecting gas supply—from the purchase of land, material, and plant for works to the sale of the gas in quantities great and small—in countries on the Continent having decimal coinage and carrying on their work and commerce under the metric system. He is therefore, so to speak, a specialist in these matters on which light is required; and so what he has to say upon them must be listened to and considered with the profoundest respect. In the circumstances, and being an Englishman, he has naturally taken an intense interest in the discussion, so far as it has gone, of the proposal to unify the British standards of weights and measures with those obtaining on the Continent; and he has more especially turned his mind to the question in its relation to the supply and sale of gas in this country. Limiting the conversation to our friend's views will make an interesting contribution to the general discussion; and the writer will therefore proceed to set out those views as closely as an extemporaneous chat of the kind will permit.

Turning from affairs of a general nature that had been the subjects of a little talk, this authority "nailed his colours to the mast" on this particular question straightway with the remark that, speaking from a Continental point of view (as he was bound to do, seeing that his Company's business in gas is carried on entirely on the Continent in many places and among people of different nationalities), "the metric system is a great advantage." With this epigrammatic assertion, he proceeded somewhat as follows: You see, the metric system, with the decimal coinage, allows of a far wider range for alterations in price and so on. I will make a comparison. English people, when they talk about the price of gas, always measure in a large quantity and a large amount of money—that is to say, when a man speaks about an increase in his consumption, he measures it in thousands of feet at (say) half-a-crown, or more, per 1000 cubic feet. Speaking in such large units at such large prices is rather calculated to appal a consumer. On the Continent, we measure in cubic metres, and charge in centimes or pfennigs, as the case may be, which represent fine fractions of a penny. When a man in Germany speaks of the price of the gas he consumes as being (say) 10 pfennigs per cubic metre, it appeals to him as being cheap. It is something like the draper's business (said this friend by way of simile), in which 19s. 11¾d. does not strike the purchaser as being anything nearly so great as a sovereign. Then, of course, when it comes to a question of a reduction of price, we can lower it by, for example, 25-100ths of a pfennig, or half a pfennig, and so on, per cubic metre. In this country, you give reductions of a penny per 1000 cubic feet, and the consumer does not see or fully appreciate the benefit of it on such a large unit figure as a 1000 cubic feet. He naturally and somewhat contemptuously asks, "What is a penny on a thousand?"

This brought the conversation on to a change indispensable and precedent to any alteration as suggested of the standards of weights and measures in this country, and to the impossibility of doing a retail trade decimally in our present coinage. I must admit, remarked our decimalizing partisan, that unless we start in England with the alteration of the coinage to the decimal system, it is no good to talk about the metric system for weights and measures. It is, of course, not impossible to express the price of gas at so much per cubic metre, but it would be absolutely unintelligible—to the masses anyway. But with regard to the coinage, up to the year 1874 the German people had the most complicated currency that one can imagine. It was expressed in thalers, in silbergroschen, and in pfennig. Now the thaler was worth 30 silbergroschen; and each silbergroschen was equal to 12 pfennig. The highest amount was therefore the thaler, which represented 3s. in our money, or 3 marks of the present German money. Here is my point—almost in a day that coinage was converted into the decimal system of marks and pfennig—100 pfennig being equal to a mark; whereas previously a mark represented 120 pfennig, and the thaler three times 120 pfennig. The Germans had therefore, in adopting the decimal system, to face a drop from 120 pfennig to 100 pfennig, And it was done without the slightest fuss or anything else. The metric system of weights and measures was afterwards introduced, also without any difficulty. I do not think it has been sufficiently recognized that our coinage lends itself very much to the decimal system—more so than did the old German currency. We should not want to alter our gold and silver coins. The 20s., 10s., 5s., 2s. 6d., 2s., 1s., 6d., and 3d. pieces could all remain without any alteration whatever—excepting perhaps the inscriptions on them; but I do not think it would be even necessary to change their names. Really all that is essential would be to alter the copper coinage; and we are pretty well on to what is wanted now. The unit of our money is the farthing; and we have heard some talk of half-farthings being made. At the present moment, there are 96 half-farthings in a shilling; and what would have to be done, to get to a decimal coinage, would be to make 100 half-farthings to the shilling. This would entail hardly any strain. Board schools are now nearly universal; and in this country we are—will anyone deny it?—in a much more advanced state in 1904 than the Germans were in 1874. So that I do think our people would not find any great difficulty in getting into the use of the new coinage. Of course, the question of naming the new copper coinage would be one for some consideration. If you get names for the new coinage that expressed some corresponding value to the old, it might at first create a little confusion, and, of course, that we want to keep away from as much as possible. But it would soon be borne into the minds of the poorest, how close the values were. Then we could have in copper or nickel coins 10 cent., 5 cent., 2½ cent., and 1 cent. pieces. It comes to this, that the 5 cent. piece would be the closest to our present copper coinage; but instead of representing a halfpenny, it would represent 6-10ths of a penny, so that for our halfpenny morning paper we should, in the new coinage, pay 6-10ths of a penny. This does not appear to me to be by any means a revolutionary proposal.

Well then our friend went on to speak of the application of this suggested new coinage to the metric system of weights and measures. Pointing out that the kilogramme represents 2·204 lbs., he said the following example shows the simplicity of the metrical and decimal systems: Take an English pound of any commodity which now costs a shilling, a kilo. would cost exactly 2·20s., which could be paid for, assuming the adoption of the new coinage, with the present two-shilling piece and two 10-cent. copper or nickel pieces, each representing 1¼d. A ½ kilo., which would be close to our 1 lb., would cost just half, or 1·10s., and so be paid for by the present shilling and a 10-cent. piece.

From this lucid explanation, we get nearer home. In regard to gas (the interesting conversationalist continued), we find abroad that the measures are much more convenient and simple than those at home. We speak abroad of a gasholder being (say) of 150,000 cubic metres capacity. This represents in England a gasholder of 5,000,000 cubic feet capacity. It is easier to bear in mind the proportionate value of a figure of 150,000 than when you run into the figure 5,000,000. This shows one of the conveniences of the metric system in connection with gas. Another is this; and I think this is very clear. On the Continent, we make a differential price for gas used for purposes other than lighting. I will take the prices previously ruling in one city. The price for lighting there was 16 pfennig per cubic metre, which represents 4s. 6·36d. per 1000 cubic feet, and 10 pfennig per cubic metre for purposes other than lighting, or 2s. 9·97d. But in many of the districts surrounding the city, the people have chosen to have an average price for gas. Now what can be easier than the adding of the 16 and 10 together, and making an average price of 13 pfennig? Take the two figures per 1000 cubic feet, and see what an awkward price you then get as an average. Omitting the fractions and adding the 4s. 6d. and 2s. 9d. together, you have 7s. 3d.; so that the average price in those surrounding districts would be, with the British coinage and measurement, 3s. 7½d. per 1000 cubic feet. Few gas companies would care to have such a price. They would either make it 3s. 8d., or 3s. 7d. But with our decimal system, we can bring it down to the closest possible figure. We can work up and down in small fractions; the poorest of our customers being perfectly accustomed to dealing with decimals. They do not trouble themselves if the price runs to big or small fractions. In France, I know of many cases where the calculations run out to three places of decimals. Yet it causes no trouble to anybody; it is so extremely easy. One of the peculiarities, in one of our cities, on the conversion of the German coinage taking place was this, that the equivalent of the old price for gas in the new came to $15\frac{7}{10}$ pfennig per cubic metre. We thought nothing of the reduction of 2-10ths of a pfennig. In prepayment meters we deal in litres—1000 litres being equal to the cubic metre, which is equal to 35·3171 cubic feet. In the event of a variation in price with regard to prepayment meters, see how extremely fine the system can be worked. In a recent case, we found that, giving a supply of 500 litres for a 10 pfennig piece, the business was not good. We simply altered the supply to 575 litres for the same coin. That is a difference of 3 cubic feet; there being 28·315 litres in a cubic foot. Therefore, I maintain, that you cannot in England work the prepayment system so fine as we can abroad; and this feature, in our experience, is a great advantage.

At this point, interest was heightened by the production of a table which this skilled figurist has worked out in connection with the charges of the South Metropolitan Gas Company. Taking their price of 2s. 2d. per 1000 cubic feet, it was seen that, expressing the gas in cubic metres and the money in our present coinage, he had obtained some extremely big decimals. But, he said (running a finger down the columns) let us take a price of a penny and any decimal, per cubic metre, that is divisible by five—say, 1·125d.; and you see from these calculations that, as soon as you come to 10 cubic metres—and no consumer's consumption is as small as that—the difficulty disappears. The price of 1·125d. per cubic metre (which is taken as an example) is equal to 2s. $7\frac{85}{100}$d. per 1000 cubic feet; and 10 cubic metres, at 1·125d. per cubic metre, brings us to 11¼d., which absolutely accords with our own coinage. Again, 20 cubic metres would be 1s. 10½d.; and, in fact, when figures are reached useful for gas consumption, the metric

system accommodates itself perfectly to our present coinage. So that, even if we did not alter the coinage, to deal in decimals (if they were known to the lower ranks of society) would present no difficulties, and see how easy it would be to alter your price by fine fractions per cubic metre.

But, after all (he said), it does come to this, that our coinage is altogether too high for our purpose. We want a smaller unit to commence with; and, if a change is to be made in the systems of weights and measures, it must be attacked, in a proper and intelligent way, through the medium of the coinage. Until people thoroughly understand decimals, nothing much can be done; but it must be confessed that decimals are much easier to grasp than fractions. If, for instance, you have a lot of $\frac{3}{8}$, $\frac{7}{16}$, and $\frac{5}{64}$ of an inch to add up, you have to reduce them to a common denominator before it can be done. On the Continent we have centimetres and millimetres, all of which are decimal parts of one another; and they can be added up without the slightest difficulty by even a child at school; but you would not easily find a child to add up so many yards, inches, and fractions of them, as expressed in this country. I must say that in my Company's business—in our books and everything else—the decimal system very considerably decreases our work. At one time, we had all our returns expressed in cubic feet and English money. Now they are made under the metric system and the coinage of the country from which they emanate. A lot of heavy calculations and conversions were formerly requisite. Now this is all changed; and the Directors and staff understand the figures absolutely without any elaborate calculation. Neither is there any difficulty between the Company and the consumers regarding the collection of accounts.

Our friend's parting thrust was this: Nearly all the Continental countries have adopted the decimal system. What the majority of people have done is surely the right thing. A little inconvenience for a minimum space of time is all that is required. At the back of the opposition to this, there seems to be a want of self-reliance. We are a long way on the road. With 96 half-farthings to the shilling, we have only a 4 per cent. alteration to make to bring ourselves on to a level in these matters with other countries.

ELECTRIC LIGHTING MEMORANDA.

Good Fortune of Kingston-on-Thames—Proposed New Classification of Electricity Undertakings—Cost of Arc Lighting—Progress at Stalybridge.

THE electricity-supply undertaking of the Corporation of Kingston-on-Thames has a reputation, of a kind, which makes the news which transpires in regard to it interesting. It is one of those municipal enterprises, classed as remunerative, which has been from the start a heavy, hopeless burden upon the rates it was meant to relieve. The chief inducement which prevailed with the Town Council of ten years ago to pledge the ratepayers' credit for this venture, was the confident hope of profits amounting to £2000 a year; "instead of which," as the Judge remarked, the annual loss has averaged about this figure—or more, if the depreciation of the plant is reckoned in. On the face of it, however, the latest annual report relating to the working of this deplorable business, just presented to the Corporation, appears to break through the interesting record of loss on revenue account which has characterized these statements all along, inasmuch as it shows a profit. With praiseworthy promptitude—most probably attributable to the improved appearance of the accounts—those for 1904 were actually published last week. Very naturally, the Borough Electrical Engineer and his Committee were jubilant over the circumstance of being able to exhibit a credit balance on the year's operations, after paying interest and sinking fund charges, of £102, instead of making the customary demand on the rates. In so far as this improvement represents the fruit of wise administration and good management, the jubilation is justified; and nobody, certainly will be so hard-hearted as to begrudge whatever satisfaction the sorely-stressed Engineer may be able to feel at his emancipation from a disheartening position. Yet, as the Mayor had occasion to remark on these accounts, they reveal, on close examination, features which deprive the financial situation of much of its rosiness.

Kingston is one of those places where a considerable proportion of the revenue of the electricity-supply undertaking is derived from the public lighting. This is tantamount to saying that it is largely indirectly rate-supported, like so many municipal undertakings of the kind in the country. Indeed, it is matter for consideration whether these concerns should not, for financial reasons, be classified in two great divisions—one containing those in which not more than 5 per cent. of the gross revenue is from public lighting and other connections chargeable to the rates; and the other comprising those in which this proportion is exceeded. Now, in the case of Kingston, in 1902-3, the consumption of current by the public arc lamps amounted to 80,256 units, charged at £882, which worked out at about 2d. per unit. Last year, while the consumption of current for the same purpose amounted to 113,343 units, the charge was £1513, or more than 3d. per unit. This charge was made notwithstanding the circumstance that the working cost per unit generated was less, owing to a reduction in the price of coal and other economies. Not unnaturally, the Mayor, discovering these features of the much belauded accounts for the past year, wanted to know the reason for their existence. The extra charge for public lighting alone far more than represents the claimed profit.

This criticism goes straight to the point, and raises the important question of what public arc lamps really cost; because it is obviously indefensible to charge a profit price for this service and call the result a gain of trade. The Mayor's inquiry was answered by the Engineer, who explained that at Kingston the former charge of £20 for all-night arc lights did not clear the expenses, which would probably be about £28 a year. It has been decided by the Committee, knowing this, to try the effect of lighting the arc lamps from dusk to 12.30, with side incandescent lamps from 12.30 till dawn. The idea is that by this expedient the original charge of £20 per lamp can be adhered to, and will just about cover the capital charges and running expenses. It is admitted that there is great difficulty in ascertaining what is strictly a fair charge to make for an arc lighting service; but, it is suggested, inasmuch as it really makes no difference in the end, because the money all comes out of the ratepayers' pockets, why bother about the charge? This rather infantile way of shuffling off the difficulty of treating the ratepayers fairly, reminds one of the artless confession of the head of a municipal electric lighting undertaking recently opened in the Midlands, who told the company at the inevitable inaugural ceremony that the property was their own, and they would have to pay for it—if not as consumers, then as ratepayers. In such circumstances, the amount of the public lighting rate becomes significant. At Kingston, the Town Council are flattering themselves because the rate does not exceed 6d. in the pound. Before going into electricity supply for the sake of an expected profit, the rate was about 2d. in the pound, as it is still in other localities which have so far contrived to keep themselves free from this "boon and blessing."

During the parliamentary campaign of the North-Western Mond Gas Company, some strong opposition was offered to the scheme of the promoters by the Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board. Not very much has hitherto been heard outside concerning this rather remarkable municipal combination; but there were ample reasons why the Board should have given the most determined fight to those whose proposals threatened interference with their operations. It was, of course, the cue of the Mond gas promoters to make light of the pretensions of the Board; but, in reality, this is among the most interesting electrical developments in the whole country. It is one of the drawbacks of the British system of local self-government that it encourages a sentiment of small particularism, which in some localities has actually been carried to a ridiculous extreme. Just as of old the boys of a small town and its suburb were always fighting, so the otherwise sensible burghers of districts only divided from one another by name, have set up mutually independent local authorities, with all their accessories. True, this unintelligent tendency was fostered, if not forced, by the arrogance and selfishness displayed by some of the larger Corporations, especially Manchester and Birmingham, towards outlying districts, whom they made pay smartly for any privilege they had by reason of this propinquity. Municipal trading for profit was at the bottom of this abuse of the powers of local government; and it is interesting to note that in cases which are now becoming numerous, the force of economical considerations is helping the reaction. Small independent local authorities in the vicinity of the large centres of population are now clubbing their resources, and uniting to serve themselves with those necessaries of town life which can be supplied with advantage in bulk—up to a point—but are not necessarily, nor even advisably, to be had merely by dependence upon the central community. The Stalybridge, &c., Joint Board is therefore the outcome of a sturdy common sense, and a faculty for business which one likes to think will never be sought in vain in Lancashire. The plant first to be laid down is not very large, judged from the standard of the mill practice of the neighbourhood. Six Lancashire boilers, having a total evaporative capacity of 60,000 lbs. per hour, are not a very big thing for those parts; but they will do to start with. Every town of the group has its own electric lighting network, and its own stretch of simple electric tramway serving the industrial population of 100,000. The current will be generated in the first place at 6000 volts, alternating, at 40 periods per second. This goes to sub-stations, where it is converted by motor generators to direct current suitable for traction and lighting. The scale of charges adopted is a liberal one, as the Joint Board mean business, and are not considering gas or electricity supply interests, which must fend for themselves. Lighting at a flat-rate of 4d. per unit; motive power at from 2d. to 1d. per unit; tramways 1½d. per unit all round; no extras for meters, switches, or anything else. Motors up to 20-horse power will be hired out, with no charge for fixing or periodical inspection. Altogether, the scheme is a most businesslike one, and great things are expected from it—not in the way of municipal trading profit, relief of the rates, or any illusory artificial benefit of that kind. One would fain hope that Lancashire has learnt the lesson of the mistake of making the traders subsidize the rates, and is rather inclined to take the opposite course, which has been so conspicuously exemplified in the case of the Manchester Ship Canal. That is the best municipal policy which tends to encourage the providing of the most capital in the district; and this move of the Stalybridge Joint Board looks like a recognition of the truth.

THE NEW "NEWBIGGING'S HANDBOOK."*

THE appearance of a seventh edition of Newbigging's "Handbook" gives one a sharp reminder of the flight of time. It also suggests other reflections of the kind which have come down to us from the ancients, as to the usual concomitants of this passage. How things change with the times, and how we change with them! The gas industry of to-day is a very different thing from the somewhat stodgy employment which engaged those of his colleagues for whose guidance Mr. Newbigging first published the contents of his note-book. Let us not be unmindful of the share taken by the author of the "Handbook," in bringing about whatever is sounder and more regular in the fundamental rules of gas manufacture. If there now appears to be not a little that is obvious or even commonplace in this old familiar gas managers' *vade mecum*—to revive an old-fashioned term which seems appropriate to the subject—it should not be forgotten that lessons once learnt are apt to seem trite. There are, moreover, always recruits to be put through their facings; and until these neophytes know their "Newbigging" by heart, their knowledge of technical matters will not amount to much. The "Handbook" is an institution of the gas industry; and inasmuch as the supply is continually running out, it must be constantly replenished.

Newbigging's "Handbook" was never a dry-as-dust compilation. The author, gas manager and consulting engineer as he is, always stamped his personality upon his work. He had the habit of putting down precisely the information which he found useful in his own practice; and this, more than any other, is the cause of his popularity with followers of the same calling. Of course, this personal principle of text-book writing has its own defects and limitations, which need not be particularized. No man, however competent and trustworthy, is a universal specialist, even in his own calling. The "Handbook" never professed to sound to their depths all the departments of science which have more or less to do with gas making and utilization, but is merely offered as a guide along the plain highway of the industry, from its technical side. Attention to the leading principles involved in the production of satisfactory practical results was always the author's first and foremost care. He still adheres to it; and no man can properly claim to be expert in this trade unless he knows all that Mr. Newbigging can tell him about "the way to do it." There are some principles and standards which never grow old, and can never be neglected by the technician. These are to be found, more than anywhere else, in the "Handbook." Of course, they are not all of them there; and some that are included are disputable. This is only to say that the art of good gas making has not been reduced to black and white; but the same observation applies to every art that is alive. A guide for gas managers is not intended for a crib, to make attendants at lectures on gas manufacture able to pose as gas engineers.

Mr. Newbigging describes and illustrates retort-settings and the housing thereof, not omitting the case of inclined retorts, as to which he prefers the face-to-face arrangement of double benches. His treatment of gaseous firing of retort-settings is excellent; and he is an admirable guide through the complexities of the choice between inclined and horizontal carbonizing elements. This is, really, the best feature of the "Handbook"—the truth, that is to say, which lies on the surface of the author's writing on a number of highly technical problems, that it is adequate knowledge and ripe judgment which inspires the words. There is none of the cheap amateurism of so many *pseudo*-technical books here. Whatever else Mr. Newbigging is, he always is a competent gas engineer; and it is impossible to ignore it. Plenty of proof of this will be found in the section of the present volume which treats of carbonizing. Still, there are small slips. In writing of the difficulty of obtaining even charging in the case of the original Coze inclined retorts, it is remarked that "the mouthpieces were a prolongation of the retorts, and were bent upwards, all reaching to the same level." The word "charging" interpolated before "mouthpieces" in this passage would have made the meaning clearer. The author has brought his revision of carbonizing machinery down to include the new "projector" machines. His comments on retort-house work generally are shrewd, and instinct with experience. Whether or not one accepts all his dicta implicitly, one feels that they are always based on the author's own convictions, and that nothing offered in this way is second-hand. If this is the explanation of his stopping short, occasionally, of certain criticisms that might be expected of him, it is at least a respectable reserve.

On purification Mr. Newbigging is an acknowledged authority; and the "Handbook" is well supplied with all necessary information on this subject, as ordinarily cultivated by the gas manager who has not the fear of the sulphur clauses before his eyes. This is the case of the great majority. The technic of the most thorough sulphur purification is only practised by a handful of Metropolitan gas managers, with a strictly limited Provincial contingent in like case. Those who need the fullest information on this refinement of gas purification are directed to trustworthy sources whence it may be obtained. Mr. Newbigging has not yielded his well-known opinion antagonistic to what he calls an "unnecessarily high pressure of gas in the mains and service-pipes," which he holds to be "synonymous with a heavy leakage account." It is easy to understand that a gas manager whose business principles were formed at a period when low-pressure distribution was esteemed the high road to economical working, feels great reluctance to recast his formula. True, the author speaks scornfully of those critics of his famous "Golden Rules" who are so dull as not to perceive his meaning; and he is solicitous to point out that he does not advise that the pressure should be kept down "to an abnormal extent." Whatever pressure is required must, he admits, be maintained; but he is afraid of a "wasteful pressure." The point is, however, that this counsel is no longer in accordance with the larger interest of the gas manufacturer. What Mr. Newbigging would doubtless recognize as the normal pressure requirement of a gas distributing system has more than doubled since he first saw a source of economy in keeping down "superfluous" pressure. He does not mention this fact. Incandescent gas lighting, and every other modern application of gas, necessitates a higher pressure than would have been deemed prudent twenty years ago. Mains and services must be made staunch under this higher pressure. For this reason, we must take exception to Mr. Newbigging's "Rule" in this regard, and suggest that it should be replaced with another, to read: "Consumers' complaints of bad gas mean insufficient pressure." Fear of increased leakage must be disowned as a reason for looking askance at a high distribution pressure. It is further significant of Mr. Newbigging's attitude on this point, that the subject of high-pressure gas delivery, by the aid of the "booster," is not mentioned by him. High-pressure transmission of gas he ignores. On the contrary, he lays it down on p. 243 as a salutary rule, that "the maximum initial pressure in a district during the hours of the heaviest consumption should not exceed 20 tenths." Really, bearing in mind the fact that an ordinary Welsbach burner wants gas delivered to it at from 12 to 15 tenths in order to do its best, this is not an adequate revision for an old standard.

Most gas managers will consider the treatment of carburetted water gas by Mr. Newbigging to be insufficient, having regard to the importance of this manufacture to the industry. It only occurs as one of several methods in a list of enrichers—not at all as a bulk product. On the other hand, there is a good deal in the book, in the shape of arithmetical tables, sketches of illumination devices, and memoranda relating to weights of materials, and so forth, which is very little more than padding. It is far better for compilers of technical books to eschew these matters, so many of which are common to all trades. Tables and formulæ used in engineering work should be left to their own proper places in table-books. But one gets on satisfactory terms again with Mr. Newbigging in connection with his wise remarks on the general character and trend of the gas industry. What he has to say in this chapter is his own; and his co-efficients of cost of works construction are peculiar to the "Handbook." His index, as usual, is excellent.

* "Handbook for Gas Engineers and Managers." By Thomas Newbigging. Seventh Edition, Illustrated. London: Walter King; 1904.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 588.)

BUSINESS on the Stock Exchange last week was decidedly quiet. For some time after the re-opening on Tuesday from the Whitsuntide holidays, members gradually straggled back; and the attendance for the first few days was poor. The settlement, however, demanded attention, and was fairly heavy. Gilt-edged securities were a good market; but apart from these, the general tendency was dullish, yet with a rather more favourable tone just at the close. The supply of money in the Money Market continued abundant, and was fully equal to meeting calls for the Stock Exchange and month-end requirements. Discount rates showed an easier tendency. Business in the Gas Market was considerably quieter—in fact, on only one day (Friday) was there anything like an approach to moderate activity. Movements in value have been few and slight, but almost all were in the upward direction—indeed, in only one special case was there an exception to the rule. We are now through five months of the half year; and it is possible to make a rough estimate as to how gas undertakings in general will be found to have thriven by the end of it. The two chief factors of prosperity are decidedly favourable. Almost everywhere there is a continued and increasing demand for gas, which maintains its progress despite the rivalry of other illuminant and calorific agents. Then the spring coal contracts have been concluded at easier prices; and a portion of this gain will come into the half year. On the other hand, the markets for residual products have been lower. On balance, the first half of 1904 may be expected to compare not unfavourably with the corresponding period of 1903. Last week, business in Gaslight and Coke ordinary was moderate at steady figures, which never ranged outside 94½-95¼, with perhaps a disposition to go better. The secured issues were quiet but firm; and the preference advanced a point. South Metropolitan was moderately dealt in at steady prices, which ranged from 125½ to 126¾. Nothing at all was marked in Commercials. A few dealings were recorded in the Suburban and Provincial group, and some quotations rose—viz., Brentford, Bromley, and Southampton. In the local Exchange, Liverpool "A" had a further rise. Very little was done in the Continental Companies. European and Union were steady; but

Imperial slightly receded. There was nothing to note in connection with the remoter undertakings. Moderate business was done in the Water Companies; and the tendency was favourable. Several ordinary stocks had a rise of from 1 to 3 per cent.

The daily operations were: Gas was quiet and unchanged on Tuesday. Wednesday was equally quiet. Imperial ordinary and debenture fell 1 each. Thursday was quieter still; but prices were good. Gaslight preference rose 1, Bromley "A" 1½, and ditto "B" 2. Friday was the busiest day. Southampton rose 2. Saturday was quite inanimate. Both Brentfords rose 2. Several Water stocks rose, as noted in the list.

PERSONAL.

There were about 90 applicants for the position of Engineer and Manager of the Bridport Gas Company, in succession to Mr. J. H. Cornish, who has taken his father's position at Bridgwater; and out of them the Directors have selected Mr. W. H. Reed, formerly of Whitchurch. Mr. Cornish was Secretary as well as Manager of the Company; but the offices have now been divided, and Mr. G. R. Garner, who has been Chief Clerk for 28 years, has been entrusted with the secretarial duties.

Mr. Henry Colman Head, the Assistant Engineer and Manager to the Bournemouth Gas and Water Company, has been appointed Engineer and Manager to the Winchester Water and Gas Company, in succession to the late Mr. F. G. Dexter. Mr. Head received his early training at the Finsbury Technical College, on leaving which he took the college certificates. He was subsequently pupil of the late Mr. Frank Livesey, at the South Metropolitan Gas Company, and previous to obtaining the position he is relinquishing at Bournemouth, was for a considerable period assistant to that gentleman. We join with Mr. Head's many friends in congratulating him on his appointment, and in wishing him success in his new sphere of work.

In view of the recent retirement, on account of ill-health, of Mr. T. L. Sheppard, the Manager of the Farnworth and Kearsley Gas Company, the Directors and workmen united in offering him a substantial token of their regard. It took the shape of a solid silver tea service, bearing the following inscription: "Presented to Mr. Thomas Lea Sheppard, by the Directors and Workmen of the Farnworth and Kearsley Gas Company, as a mark of esteem, on his retirement as Manager after 26 years' service.—May 24th, 1904." The presentation was made at a pleasant gathering of the donors which took place in the Board-room last Tuesday, under the presidency of Mr. J. W. Watkinson, who, in handing the gift to Mr. Sheppard, expressed the general regret felt that circumstances had compelled the severance of his connection with the undertaking. A more faithful, willing, and attentive servant no company ever had. He had re-modelled the works in his charge, and had brought them up to modern requirements. Mr. Sheppard expressed his keen appreciation of the kindness shown to him, and said he should prize the gift as long as he lived.

The "Flicker" Photometer.—Anyone desiring a concise account of the principles governing Simmance-Abady's "Flicker" photometer, and a knowledge of how to employ it for the measurement of the illuminating power of all kinds of lights—interior or exterior, and gas or electric lamps of low or very high powers and of diverse colours—cannot well do better than obtain from Messrs. Alexander Wright and Co., Limited, of Westminster, a copy of a pamphlet which has been prepared on the subject. We have perused it with interest, and find the information it contains phrased in a manner which will enable it to be understood even by those not professing to be experts in photometry.

Midland Association of Gas Managers.—The President of the Association (Mr. George Helps) will receive the members on Thursday at Nuneaton; and the programme that has been issued is one that, with fine weather, will ensure a very successful day. In the Assembly Room of the Conservative Club, the visitors will be met by the Chairman, the Vice-Chairman, and the Directors of the Gas Company; and afterwards the ordinary business will be transacted. A visit to the gas-works follows; and there several objects of great interest are to be seen. There is a De Brouwer charging-machine; a new patented hydraulic main, which allows the seal to be entirely dispensed with between charges, or regulated to any desired extent; gas-compressors raising low-pressure gas to 25 lbs. per square inch; the tapping of high-pressure mains, connecting services, meters, &c., and high-pressure lamps and fittings as used on the 5 miles of high-pressure main now at work; and a new high or low pressure meter, which is shortly to be put on the market by the Nuneaton Gas Company, and which is about one-fourth of the bulk of an ordinary meter, and half the cost for the same duty. This meter will register correctly at an inch pressure, or 20 lbs. per square inch. In addition, there will be seen a rotary discount meter, which was recently fully described in the "Journal." Succeeding the inspection of the works, there is to be a drive to Arbury Hall, the seat of Mr. Frank A. Newdegate, M.P., who has kindly granted his permission to view the house and grounds. Ansley Colliery will next be visited, where the machinery and pit workings may be seen above and below ground. Luncheon will subsequently be served in the Old Hall at Ansley, to which the members are invited by the Chairman and Directors of the Gas Company.

THE GRANTON GAS-WORKS OF THE EDINBURGH AND LEITH GAS COMMISSIONERS.

Analysis of the Manufacturing Costs and Charges for the Year ending May 15, 1904.

[Communicated by Mr. W. R. Herring at the request of the Editor.]

In fulfilment of a promise given some time ago, I now take the opportunity of sending for publication an analysis of the manufacturing costs and charges in connection with the gas-making operations at the Granton works for the year ending May 15, 1904. I do not look upon the results as by any means ideal nor final so far as our own operations are concerned. We have been operating during a period when labour was dissatisfied with its conditions, the character of the work being also entirely new and strange to the majority of the operatives and the foremen, apart from the fact of many incidental troubles which naturally arise in getting to work, on a permanent footing, a manufacturing concern of such magnitude. None of these have in any way assisted in reducing the manufacturing costs and charges. Such as they are, however, I give them for what they are worth.

Statement of Coal Carbonized and Coke and Breeze Produced, Sold, and Used at Granton Gas-Works in the Year ending May 15, 1904.

Coal carbonized	151,821·13 tons.
Gas made, corrected to standard temperature and pressure	1,584,758,000 cub. ft.
Gas made, per ton of coal, do., do.	10,438 cub. ft.
Illuminating power	24·45 candles.
Retort carbon produced	9 tons 13 cwt.

—	Tons.	Cwt.	Per Ton of Coal Carbonized.	Per 100 lbs. of Coal Carbonized.
Coke and breeze produced, based on the average of experiments upon the various classes of coal actually used	89,347	4	11·77	—
Sold or available for sale. *By actual weight.*	63,298	7	8·33	—
Steam raising for all general purposes	5,624	18	0·74	4·26
Travelling and derrick cranes	365	9	0·05	
Crusher and station buildings	99	2	0·01	
Culvert and quarry pumps	389	11	0·05	
Used in retort-house, by difference.	19,569	17	2·59	12·89
	89,347	4	11·77	17·15

It is regrettable that the Council of the Institution of Gas Engineers have not yet considered it to be necessary in the interests of the industry to formulate the basis upon which the items representing the entire works costs should be stated. In 1902, this question was brought prominently before the former Institution, and its necessity admitted; but up to the present moment nothing has been done. I am therefore compelled to give my figures on a basis that has been formulated to suit our own particular requirements. They will, however, I think, be found to be in sufficient detail to enable them to be adapted to the conditions prevailing in any works.

Early in the year 1902, a controversy arose in the "Journal" with regard to the relative economy of inclined retorts; and the outcome of that controversy was the general admission that some system of unification in stating the items comprising the carbonizing costs in gas-works should be formulated; the various champions being entirely at sea in dealing with each other's figures.

One suggestion was that the item of carbonizing should be entirely confined to the labour employed in the charging and drawing of the retorts and the attention to the producers, including the removal of the ashes from the same. On this basis, the Granton figures for the year work out at 1·078d. per 1000 cubic feet of gas made, or 11·26d. per ton of coal carbonized. At the time, however, I took exception to this method of stating the carbonizing costs, insisting that general arrangement and the general design of the plant had a considerable influence upon the costs of production. I therefore suggested that the item of carbonizing should include everything from, and including, the unloading of the coal to the depositing of the coke and ashes in the yard—including foreman and enginemen directly engaged in connection with the retort-house machinery (items Nos. 1 to 9 and 11 inclusive on the succeeding analysis sheet). On this basis, the Granton figures stand at 1·482d. per 1000 cubic feet of gas made, or 15·47d. per ton of coal carbonized.

The following detailed analysis of the Granton wages book, which is the summation of the weekly statement compiled for my information, will enable the exact figures relating to the many parts to be easily ascertained, although it will be seen in some cases items here have been summarized which in the wages book are still further sub-divided; the figures preceding the title on each line indicating the number of the column in the wages book, which represents further sub-division of items, so as to ascertain the exact amount of money expended in labour upon individual

parts of the same appliance or process—such, for instance, as under the heading of coal storing, coke and breeze, general purposes, and repairs to plant, residual products works, &c., &c.

Detailed Analysis of the Granton Works Wages Book for the Year ending May 15, 1904.

CARBONIZING.

			Per 1000 Cub. Ft. Pence.	Per Ton of Coal. Pence.
(1)	Foremen (three senior and three junior retort-house foremen)	£482 19 9	0·073	0·76
(2)	Discharging waggons and coal breaking	178 3 2	0·027	0·28
(3)	Elevating and conveying coal	310 15 2	0·047	0·49
(4)	Charging retorts	1,760 15 8	0·265	2·78
(5)	Drawing retorts	3,414 11 10½	0·517	5·39
(6&9)	Pipe jumping, cleaning and pointing retorts, and greasing machinery, &c., &c.	1,066 14 10½	0·162	1·69
(7)	Producer and ash men	1,955 12 8	0·296	3·09
(8)	Hot-coke conveyor	432 15 2	0·066	0·69
(11)	Enginemen for coal and coke handling plant	189 12 8	0·029	0·30
		£9,792 1 0	1·482d.	15 47d.

NOTE.—The actual duration of labour for chargers, drawers, and producer men equals 4 hours 16 min., paid at the rate of 5s. 4d. per shift of 8 hours and time-and-one-third for Sunday work.

PURIFICATION.

(16)	Lime, spreading, and slaking	£364 3 8	0·055	0·58
(17)	Oxide, charging, discharging, spreading, and turning	1,118 8 0½	0·170	1·77
(18)	Elevating and conveying	101 16 5	0·015	0·16
		£1,584 8 1½	0·240d.	2·51d.

EXHAUSTER HOUSE, WASHER, PLANT, AND BOILER ATTENDANTS.

(12, 13)	Exhausters, gas and oxygen, and scrubber-washers	£740 12 11	0·112	1·17
(14)	Boilermen and trimmers	781 12 1½	0·119	1·24
(28)	Syphonmen	113 10 10½	0·018	0·18
		£1,635 15 11	0·249d.	2·59d.

OTHER ITEMS CHARGEABLE TO MANUFACTURE.

(15)	Heating up retorts	£191 19 4½	0·029	0·30
(19)	Loco. men and shunters (half charged)	515 16 11½	0·077	0·81
(20)	Gasholder and pump-house men	300 5 11½	0·045	0·47
(28*a*,29)	General purposes—viz., office staff, weighers, storekeepers, messengers, mess-room attendants, yard cleaners, &c., &c.	2,989 8 8½	0·453	4·74
(40)	Culvert and quarry pumps	171 2 3	0·026	0·27
(43)	Filling ashes and emptying at refuse tip	373 0 4½	0·057	0·59
		£4,341 13 7½	0·687d.	7·18d.
	Total	£17,553 18 8	2·658d.	27·75d.

Briefly, it may be stated that the entire manufacturing costs, including gas making and purification and everything apart from repairs to plant and labour on coke and residual products, has amounted to 2·658d. per 1000 cubic feet of gas made, or 27·75d. per ton of coal carbonized; this figure being comprised in items Nos. 1 to 9, 11 to 14, 28, 15, 16, 17, 18, half of 19, and items 20, 28*a*, 29, 40, and 43.

In order that it may be seen that none of the ordinary manufacturing wages have been debited to the coke or other residual products account, these figures are separately recorded, as in items Nos. 23, 24, and 25 (coke sales screening and handling); this sum representing the entire outlay in handling the coke after its delivery into the yard or into the coke storage bunkers preparatory to storing it in the yard—the men engaged on the hot-coke conveying plant (who also attend to the screens, and the filling of coke waggons direct from the retort-house when the trade demands permit) being charged to the carbonizing account.

Wages on Coke and other Residual Products.

			Per 1000 Cub. Ft. Pence.	Per Ton of Coal. Pence.
(19)	Loco. men and shunters (half charged)	£515 17 0	0·078	0·82
(23, 24, & 25)	Coke sale, screening, and handling	1,882 4 3	0·285	2·97
(42)	Cyanide plant	306 9 5½	0·048	0·48
(44) (45) (46) (47)	Sulphate Manufacture—Loading and packing; Engine and boilermen; Repairs to plant and appliances	1,451 3 1	0·219	2·29
(48)	Briquette plant	159 19 1½	0·024	0·25
		£4,315 12 11	0·654d.	6·81d.

Other General Items.

(21, 22, & 26)	Coal storing	£222 13 1½	0·033	0·35
(39)	House properties	170 1 3½	0·026	0·27
(39*a*)	New Street works	31 9 4½	0·005	0·05
(39*b*)	Assembly Street properties	75 2 7½	0·011	0·12
(40*a*)	Quarry stone work	18 14 0	0·003	0·03
(50)	Holidays and allowances	643 0 5½	0·099	1·02
		£1,161 0 10½	0·177d.	1·84d.

The next item that probably requires some explanation is what is commonly entitled repairs and maintenance account. It has been the practice in Edinburgh—I might also say Scotland—to differentiate between these two terms; the item of repairs being strictly confined to the actual repair and upkeep of the plant and appliances in connection with the undertaking, and the expression maintenance being interpreted as the general charges on purposes involved in maintaining the undertaking as a going concern, and not in maintaining the plant. Hence the extraordinary difference in published returns between the repairs and maintenance item in English gas-works and similar figures in Edinburgh; the charges in connection with the going concern being included in wages, and added to the general manufacturing account. For instance, under the heading of wear and tear in the last published issue of "Field's Analysis," 1902, wear and tear stands at 4·05d. for the English Corporations, 4·08d. for London, and 3·99d. for London Suburban Companies, as against 2·22d. for Edinburgh. It is not claimed that we have done our repairs at so much less than anybody else, especially when it is remembered that we work at higher heats and four-hour charges. It is simply that many items ordinarily charged to this account in the English practice are not so treated in our case.

The sub-division of the headings in connection with the repairs to plant and appliances are the following, with special sub-sectional divisions, particularly of item No. 37, and of any other item where special information may be desired.

Repairs to Plant and Appliances.

			Per 1000 C.b. Ft. Pence.	Per Ton of Coal. Pence.
(10)	Mechanics and labourers at sundry repairs while running	—	—	—
(27)	Permanent way, railways, and sidings	—	—	—
(30)	Retorts and producers and fire-brick work	—	—	—
(31)	Ironwork	—	—	—
(32)	Hot-coke conveyor	—	—	—
(33)	Carbonizing machinery	—	—	—
(34)	Purifying machinery	—	—	—
(35)	Engines and exhausters	—	—	—
(36)	Tools and implements	—	—	—
(37)	Works—general	—	—	—
(38)	Boilers	—	—	—
		—	—	—

Our repairs and maintenance account covering the whole of the preceding items amounts to 1·406d. per 1000 cubic feet of gas made, or 14·68d. per ton of coal carbonized for labour only. The repairs and maintenance items, however, cannot be accepted as a basis of comparison, as they represent work done to a plant during the second year of its life. It is not, consequently, a fair item of comparison with one that has been running a longer period of years. On the other hand, a great deal of finishing off and polishing up of the work has been charged in this item, instead of, as it might justly have been, to the capital account; and, further, our locality is such that we have been obliged to equip our mechanics' shop in so thorough a manner as to enable us to deal with anything and everything in the way of repairs to plant, appliances, or machinery. We, therefore, do a great deal of work that is ordinarily procured from outside. This cost is represented by wages in our case, instead of appearing as invoices for goods in the usual way.

A New American Gas-Engine.—The American Correspondent of the "Engineer" calls attention to a new gas-engine which has lately been produced. It is of the heavy-duty type, with tandem cylinders, built by the Blaisdell Company, of Bradford (U.S.A.). It is used to drive an electric generator, mounted on an extension of the engine-shaft, or to drive an air or gas compressor, with the air cylinder mounted tandem behind the rear gas cylinder. The two double-acting, four-cycle cylinders are fixed upon a heavy cast-iron bed-plate, the frame being of the enclosed self-oiling type, with bored guides and splash lubrication from the crank chamber. The pistons and rods are cooled by water; the rods being encased in steel tubes, through which the water circulates. The valves and igniters are operated by a cam-shaft parallel with the cylinders, and driven directly by gearing from the main shaft. One cam operates both the inlet and the exhaust valve. The igniters are driven by eccentrics. The mixer is one of the important features of the design, and is of tubular construction, made entirely of phosphor bronze. The volume is regulated by the governor—the quality of the mixture remaining the same, regardless of the load. The governor has simply to oscillate the mixing-valve as the load increases or decreases, and is very sensitive. Two large machines of this type have been built for pumping natural gas at 200 lbs. pressure.

THE NEW WORKS OF THE HASTINGS AND ST. LEONARD'S GAS COMPANY.

PROGRESS AT GLYNE GAP.

THE hand of the builder and of the engineering contractor has been busy during the past twelve months transforming from a state of comparative nakedness to a condition of utility the site of about 20 acres extent which the Hastings and St. Leonard's Gas Company purchased some time since for the purpose to which it is now being put. The site is destined to bear new gas-works built in three complete sections, each of a productive capacity of 2 million cubic feet, without taking count of the carburetted or other form of water gas which may be installed there according to future want or improvement. It hardly seems possible, and yet it is so—indelible records of the printing-machine will not allow the evasion of the truth—that it is now twelve months since the writer wandered over the site, saw the roofed-in No. 1 retort-house, the lower part of the fabric constituting the coal-stores, foundations for other structures, pegs marking out the spots where other buildings would eventually be reared, trenches being dug for the works mains and connections, and having pointed out to him by the Engineer of the works (Mr. C. E. Botley) and his Chief Assistant (Mr. C. F. Botley), the Engineer-in-Charge at Glyne Gap, the many special features of their large scheme. Great—one might almost say remarkable—progress has since then been made. Much of that which was foreshadowed a year ago has become a reality, and now one can appreciate with far more clearness than then all that the scheme enfolds.

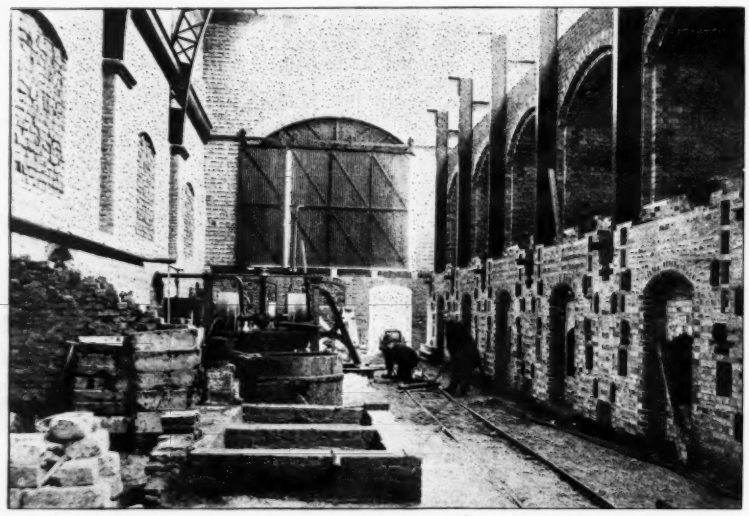


FIG. 1.—PROGRESS IN THE RETORT-HOUSE IN SEPTEMBER LAST.

Although a year ago the work and the plans had been developed to a stage at which an illustrated description had an interest for numerous readers, the description embracing as it did an account of the engineering difficulties connected with the site and the manner in which they had been overcome (producing in certain respects some rather unique features for a gas-works), a considerable amount can now be written showing what has definitely been done beyond that which had materialized when the description referred to was published,* and now, of course, shorn of the uncertainty which always envelops work which is not the subject of actual and inflexible contract. When on the site last time, No. 1 retort-house was completed, so far as the exterior brickwork, the roof, and the foundations for the retort-settings were concerned. A visit a few days since showed the interior construction practically completed, save for the bench fittings, and the installation of the stoking machinery and coal plant. The coal-stores, with the huge water-tanks underneath, have also been finished to the stage ready for the reception of the plant; the lift-house and the combined traverser and weigh-bridge are now receiving the finishing touches (these, as described in June last, being of special interest); the power-house, boiler-house, and shaft, are rapidly nearing the stage at which the first set of plant can be put on to their settings; and the large purifying-house, of which only part of the foundations and the trenches for the remainder were in evidence a year ago, is being rapidly erected. The structure itself is only awaiting the roof, and the purifiers are being built as fast as possible. The installation of other plant has been commenced; and the entrance offices, store-rooms, lavatories, men's lobbies, &c., are all in an advanced condition. From this, it will be seen that the framework of a year ago is now being as expeditiously filled in as circumstances allow. It is expected that next October will see gas being produced in the first section, with one bench of retorts, and the gas being pumped and drawn to Hastings for distribution from the gas-holders at the old station.

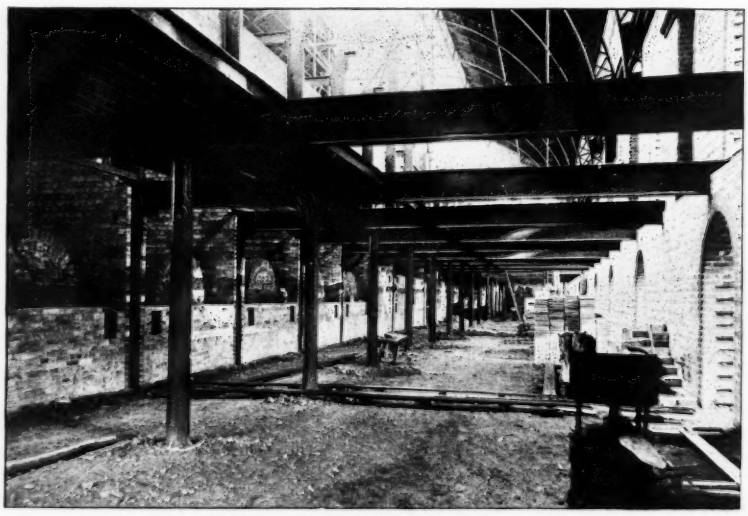


FIG. 2.—BASEMENT ON ONE SIDE OF RETORT-HOUSE (TAKEN IN NOVEMBER LAST).

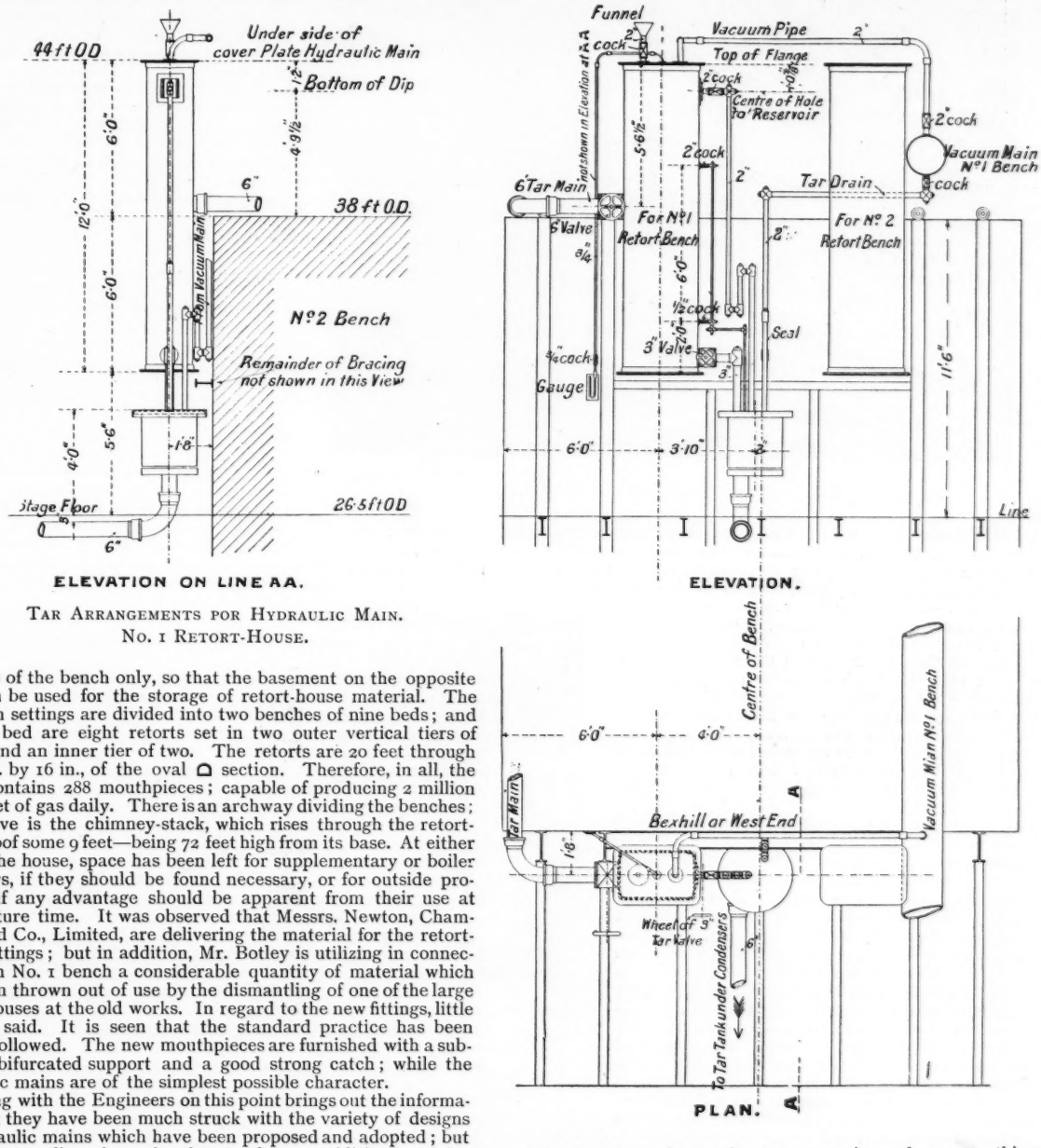
IN AND ABOUT NO. 1 RETORT-HOUSE AND COAL-STORES.

There is no need to pass again over the ground so fully traversed in the series of articles already referred to. The present articles must, therefore, be taken as merely a report on the progress of the works, including information supplementary to that previously given; and they should be read, in order to get a thorough view of this large (for the Hastings Gas Company) epoch-making scheme, in conjunction with the former series of articles.

A better starting-point than the retort-house cannot be found. On foundations which were in May last ready for the purpose, the Winstanley Speciality Company (who were the Contractors for the retort-settings and chimney stack) have finished their part of the work; and one of the two benches, comprising half of the retort-beds in the house, is now under slow fire. There is no necessity for great haste—everything is so well in hand. But the weeks between now and when Mr. Botley hopes to make gas in, and pump the first gas from, the new plant and send it away to Hastings will soon fly; so that he is keeping a very watchful eye on the progress of affairs. In accordance with present plans, as just mentioned, the one bench only will be used in the autumn, in order that a thorough trial may be made of the plant. This will serve the two-fold purpose of enabling any modification to be made in the plant that the experience gained may show to be necessary, and of permitting the men being individually initiated and instructed in their duties, and so get them accustomed to the new conditions of work before the whole section is brought into full swing. By these means it is hoped to get the maximum of working efficiency from all concerned.

There is not much to be said about the settings, because they are of the Winstanley Speciality Company's well-known type, and built in their usual good solid style. So far as the eye can see (and there is no doubt that the same applies even farther than that), the brickwork is all that can be desired. The generators are fired

* See "JOURNALS" for May 26, June 2, 9, and 16, 1903.



TAR ARRANGEMENTS FOR HYDRAULIC MAIN.
NO. 1 RETORT-HOUSE.

one side of the bench only, so that the basement on the opposite side can be used for the storage of retort-house material. The eighteen settings are divided into two benches of nine beds; and in each bed are eight retorts set in two outer vertical tiers of threes and an inner tier of two. The retorts are 20 feet through by 22 in. by 16 in., of the oval ⊏ section. Therefore, in all, the house contains 288 mouthpieces; capable of producing 2 million cubic feet of gas daily. There is an archway dividing the benches; and above is the chimney-stack, which rises through the retort-house roof some 9 feet—being 72 feet high from its base. At either end of the house, space has been left for supplementary or boiler chimneys, if they should be found necessary, or for outside producers if any advantage should be apparent from their use at some future time. It was observed that Messrs. Newton, Chambers, and Co., Limited, are delivering the material for the retort-bench fittings; but in addition, Mr. Botley is utilizing in connection with No. 1 bench a considerable quantity of material which had been thrown out of use by the dismantling of one of the large retort-houses at the old works. In regard to the new fittings, little need be said. It is seen that the standard practice has been closely followed. The new mouthpieces are furnished with a substantial bifurcated support and a good strong catch; while the hydraulic mains are of the simplest possible character.

Talking with the Engineers on this point brings out the information that they have been much struck with the variety of designs for hydraulic mains which have been proposed and adopted; but they fail to realize where the changes from established practice possess any special merit. Seeing that this is tantamount to a reflection upon those special designs, it is with some regret they have come to the conclusion that there is "nothing in them." Therefore—and as they decided to utilize some of the discarded fittings from the Hastings works, which involved the use of semi-circular cradles—they have confined themselves to that design, satisfied fully as to its meeting their requirements. The mains are separate, one for each setting on either side, and are fitted with eight dips (with provision for a ninth, if hereafter on reconstruction a ninth retort is adopted), a gas-outlet at the side, and a tar-outlet at the bottom with a funnel connection for maintaining the level of the seal. It has been determined to "condense hot," if such a phrase can be permitted—in other words, the gas will reach the condenser at the west end of the house within a minute of the time that it leaves the hydraulic main. This is a departure from the general practice, though it is not novel. At the same time, arrangements have been made for an additional condensing-main within the house should it be deemed necessary after trial; but the adoption of the plan tells of the confidence of the Engineers in its success. In all such matters, as well as in larger ones, Messrs. Botley have collaborated before arriving at a conclusion.

Again, the tar is being dealt with in a novel way, so far as Hastings is concerned, but not so in several other works—more especially in the Midlands. The essential feature of the plan is the continuous removal of the tar. The drawing will explain it clearly; but, briefly, the arrangement is this: The tar-outlet at the bottom of each hydraulic main is connected through a valve to a tar-main, which takes the tar from each side of the bench. This tar-main is connected directly with a seal reservoir at the end of each bench, and, of course, the tar is running continually away. As there is no weir or adjusting valve on each main, this arrangement is made on the tar reservoir, and so everything flowing away from the hydraulic main is constantly under notice. It is then delivered through simple syphons into a funnel connected with the tar-well. Periodically, the reservoir is completely emptied. The hydraulic mains are filled up to the overflow-line with liquor, as it has been the practice at Hastings to work with liquor and not a tar seal. It is, of course, necessary for all the tar-pipes to be perfectly tight, as they are under vacuum the whole time. The entire arrangement is levelled up to the water-line by adjusting-screws on each hydraulic main; the reservoir itself being also capable of adjustment. It is noticeable that it is not possible after levelling up to unseal the dip-pipes; a weir (a simple surface-plate arrangement made in the Company's own workshops) being so constructed that, when at its minimum, it allows a ¼-inch seal on the dips. The arch-pipes are of the ordinary semi-circular form, with cleaning-out doors at the junction on either side; and all these pipes, as well as the ascensions, are of 6 inches throughout.

The stage-floors of the house are found to be in an interesting condition just now for inspecting the details of their construction. The ironwork is actually completed; but the fortified concrete arches in the north-east section have yet to be built in, and other parts have still to be paved. These floors, so far as the ironwork and staircases are concerned, have been erected by Messrs. Samuel Cutler and Sons. In the contract for the retort-settings, provision was made for the buckstays to be arranged to suit the requirements not only of the stage-floors but of the overhead coal-hoppers; and consequently it is seen that it was possible to adopt a simple construction for the floors. Essentially these consist of 14 inch by 6 inch cross-girders, extending from the buckstays to the set-off provided in the side walls of the house (see figs. 2 and 3). Underneath each of these cross girders, and at a point where vibration might occur, and in a position which

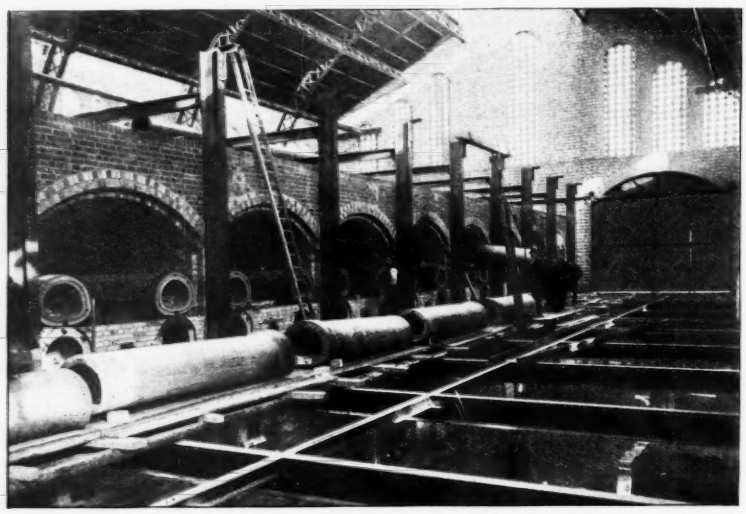


FIG. 3.—COMPANION PICTURE TO FIG. 2.

is out of the way of anything else, cast-iron columns are provided. The rails for the stoking machines are carried by 6 inch by 5 inch longitudinal joists; and the openings in front of the benches through which the coke is discharged are finished with angles—these being fitted in such a way as to render their renewal economical and easy. The general centres of the floor cross girders are 10 ft. 10 in.; but the middle bays of the two floors are 14 feet centres. With the latter exceptions, the bays have all been filled in with flat arches of fortified concrete (fig. 4). The centre arches, with the wider span, are built with a slight camber. In the construction, No. 10 expanded steel has been used; and the concrete is 8 inches thick at the centre. The concrete was gauged six to one with beach sand and portland cement of the Sussex Portland Cement Company's manufacture. A space of 3 inches is allowed on the top of the floor throughout to provide for the paving; and reversible blue bricks, 12 inch by 6 inch by 2 inch, are now being laid. The difference in the space allowed and the depth required by the bricks is made up with sand, of which the Company fortunately possess a very large supply on the site. Space has been left between the outer edge of the floors and walls to allow of expansion—this space being merely filled in with loose material. Staircases are provided at four points—one near the outer walls at about the centre of each floor, and one on each floor at the east end of the house. These stairways are removable, so that retorts and other material can be readily hoisted from the store below on to the stage-floors. Between Nos. 1 and 2 houses—at the east end of the house—there will ultimately be a gangway (on the same level as the stage-floors), across which the stoking-machines will be able to run from house to house. The space referred to will be seen in one of the photographs (fig. 9), which shows the east wall of No. 2 house already built for convenience to the height of the stage-floor, or 9 ft. 6 in. high. This gangway will be reached by one stairway, which will, of course, answer for the end of either house, and for the men's lobbies, &c., built at the end of the coal-store and above the end arches of the underground water-tanks. Looking at the last-mentioned photograph again, the three doors in the part of the building referred to are, respectively (from left to right), the foreman's office, stokers' lobby, and lavatory.

So much for the interior construction work thus far completed in the retort-house; and now a word as to the plans for charging the retorts and dealing with the spent charges. Tracks have been laid on the stage-floors for the installation of West's compressed-air combined charging and drawing machines, with a first instalment of coal-storage hoppers placed centrally. If photograph (fig. 4) is glanced at, it will be remarked that brackets have been fixed to the tops of the buckstays; and the alignment of these corresponds with the lower girders connecting together the main principals of the roof. Support is thus obtained for cross girders to carry the storage hoppers. These will be of sufficient capacity to permit of the storage during the day time of the coal requirements for the night consumption. Mention of the coal-feeding arrangements recalls to mind the several plans that have been made for dealing with the coal from the sidings and into and out of the coal-store, or direct into the retort-house. They form a system which, in its alternative methods of dealing with the coal, removes it from the common track, and causes it to stand unique among the coal arrangements of gas-works. Many gas-works have one or more of the plans in use, but their coal-handling systems are not constituted of so many parts and methods as in the present case. To write upon them again would only be to reiterate the full description published in the previous series of articles; and, as the scheme is being completed in every particular as then set out, interested readers may be referred to that account of them. But, generally, the coal breakers and elevators are arranged very conveniently for working, either from stock, or from an overhead railway in the coal-stores, or from the more general method of the ram and tipping-pit on the railway sidings. The breakers and elevators are to be driven by separate electric motors in duplicate for each purpose; the current being derived from an electric set in the machinery house driven by a 90-horse power Westinghouse gas-engine. On reading this, there may be an elevation of eyebrows on the part of some gas engineers; but Messrs. Botley are quite prepared to defend their choice. It is well known—or if it is not it is due to not regarding statements previously

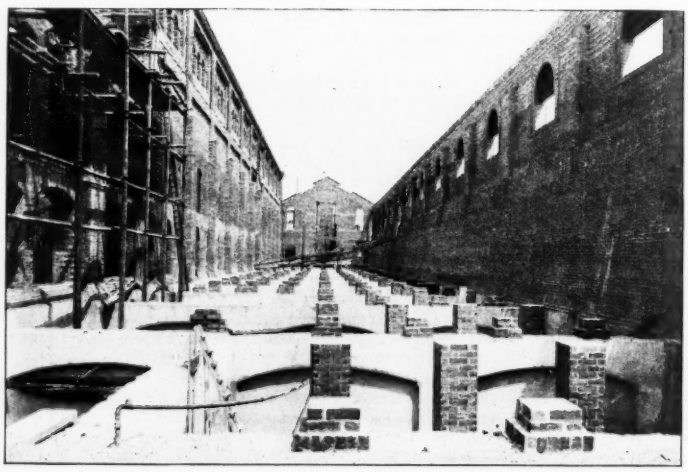


FIG. 5.—NO. 1 SECTION OF COAL-STORES (TAKEN IN JUNE LAST YEAR).
(Giving an excellent view of the large Water-Tank under the Store-Floor).

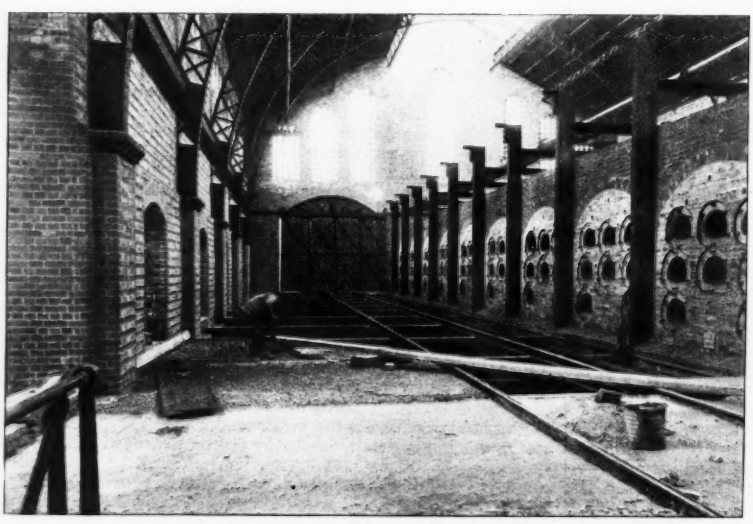


FIG. 4.—VIEW, TAKEN ON MARCH 24 LAST, SHOWING PROGRESS OF BENCHES AND CONSTRUCTION OF STAGE-FLOORS.

FIG. 6.—VIEW IN THE COAL-STORE (TAKEN IN NOVEMBER LAST).
(The Roof Work is clearly shown, with the Staging for Overhead Railway and Tanks).

published—that an important item in the commercial propaganda of the Hastings and St. Leonard's Gas Company is the demonstration of the efficiency and economy of the gas-engine as a means of generating electric current for purposes of lighting and power where electricity is preferred. They have successfully done this for years at the old works in Hastings; and their experience has decided the Engineers, after considerable experiment, to employ electric motors largely in connection with the Glyne Gas-Works. They have had electric motors (supplied by Electro-Motors, Limited, of Manchester) under trial at the Hastings works for several purposes—for example, driving exhausters, scrubbers, workshop machinery, and for other objects; and, to both Engineers and men, the motors have given the greatest satisfaction. The writer saw the motors in operation a few days since; and their noiselessness, ease of manipulation (by simply starting and discontinuing by a switch arrangement), and the small space occupied, make one look upon them with a kindly eye. It was learned that by them it only takes 0·05 per cent. of the gas exhausted—used in the gas-engine driving the dynamo—to operate the exhausters. One of the two viewed is a standard continuous-current motor, completely enclosed; and, though only a small thing, it will give 10-horse power, and 15-horse power on an emergency. The trials made, supplemented by careful consideration in other directions, have determined Messrs. Botley to use them in the manner explained, and in other directions.

While referring to the coal-stores (figs. 5 to 7), passing mention may be made of the fact that three of the four sidings on the large embankment made by the reclaiming of land through the building of the immense retaining-wall have been laid, and the fourth will be put down immediately the work adjoining the coal-stores in connection with the laying of a line of hydraulic pipes has been completed. The coal-stores have been practically finished in the fashion formerly described; and the huge water-tank under the floor (fig 5), which the construction of the floor upon arches and the contour of the land favoured, has already been filled to the top water-line (that is to say to a depth of 7 feet) through the inflow of the copious rains which have fallen upon the surrounding fine watershed. Of course, a time will come when the neighbourhood will be all cut up into building estates, and will be properly drained; but Mr. Botley has no fear about not being able even then to impound in the tanks sufficient water for the rougher uses and service of the works. For other purposes it will be seen later that he has made provision elsewhere for a supply to different parts of the works by gravitation from an overhead tank of great capacity. Then the lift-house (fig. 8) with its powerful 20-ton lift and turntable for dealing with full and empty trucks at the various required levels, and the adjoining traverser and weighbridge (fig. 7) for taking two trucks at a time from the sidings direct into the coal-store, for despatch on the overhead line in the store, or on to the turntable for transmission into the yard, have in all particulars been constructed after the plans previously sketched. There is perhaps one temporary variation. It is not intended to put in the whole of the hydraulic machinery at once; and therefore, for the purposes of the plant just referred to, it has been decided to drive the pressure-pumps by means of an electric motor, as there will be electrical power available. At the east end of the coal-store an accumulator and the necessary plant have been installed for use in this connection, until such times as the scheme is completely matured. Upon these several highly interesting features and their details, a vast amount of thought must have been bestowed; and any engineer visiting the works will have his interest aroused to no small degree by the collection of plant for dealing with railway trucks and material in bulk. The railway system about the works is also being carried out precisely on the plans previously traced; time having brought no suggestion for improvement on the lines first decided upon, which will allow of in-and-out traffic without impediment at any of the parts of the works where material will require to be dealt with in bulk. Readers who wish to refresh their memories on these points without perusing the whole of the descriptive matter published last May and June, will find the necessary assistance in the general outline plan of the Glyne works which appeared in the "JOURNAL" for June 2 last.

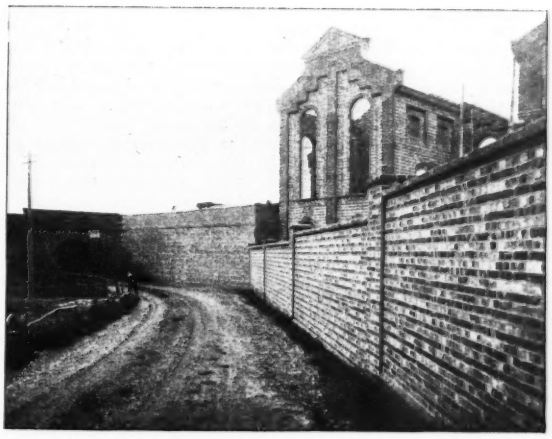


FIG. 8.—AN EXCELLENT VIEW OF THE LIFT-HOUSE (TAKEN IN SEPTEMBER LAST).

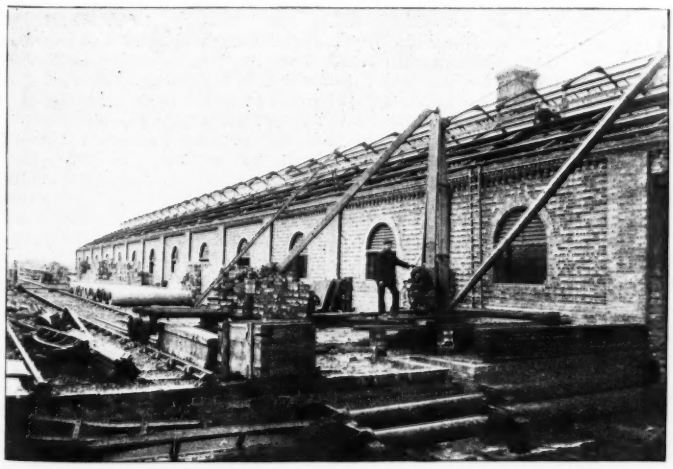


FIG. 7.—SOUTH ELEVATION OF NO. 1 COAL-STORES.
(This view shows the Railway Sidings and, in the foreground, the Pit for the Traverser and Weighbridge.)

It is necessary now to hark-back to the retort-house arrangements, to include a few words as to the mode of dealing with the coke. In the stage-floors (as will be observed in the photograph (fig. 4), there are continuous openings—on the one floor 3 ft. 6 in. wide, and on the other 3 ft. 10 in. These will be covered with guard-plates, which will also act as guides for directing the coke into moveable shoots below. These fittings are being made in the Company's own workshops at Hastings; and directly the coal and stoking machinery is installed, the coke-shoot fittings will be placed in position. The shoots will traverse angle-iron runners under the floors; and they will deliver into side-tipping trams running on a 2-feet tramway. The relative advantages, under the particular circumstances of this house, of this mode of dealing with the coke and hot-coke conveyors have been very minutely studied, with the result that this (the original) idea has been adhered to. Outside the east end of the house, in direct line with the outlet of the lift-house, is a truck-dock into which railway trucks will be lowered and raised again by a hydraulic lift. The coke as delivered into the trams will be quenched, and then run along and tipped straightway into the

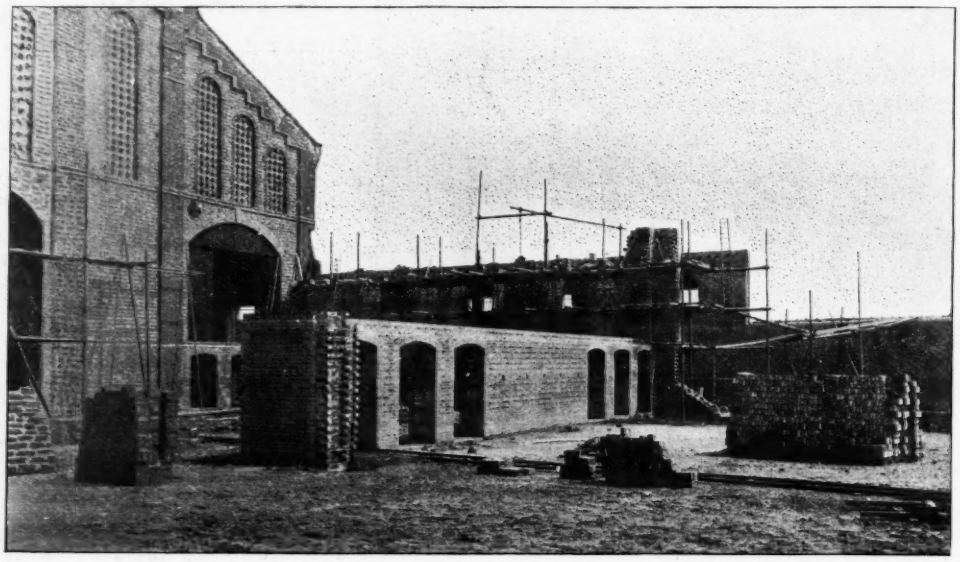


FIG. 9.—THE WEST END OF NO. 1 RETORT-HOUSE, SHOWING THE EAST-END WALL OF NO. 2 HOUSE ERECTED TO THE STAGE-FLOOR.

railway waggon in this dock—the top of the waggon being level with the ground surface. This will mean a considerable saving in the handling of material, and consequently of manual labour; and it will be seen that the system even lends itself to a waggon load of coal being delivered and within seven hours the coke resulting from the carbonization being loaded into the same truck without being touched by hand in any way. As one looks at all these things, recognition is inevitable that earnest care and heed have been accorded in all particulars to the question of economical working from the labour point of view.

Now one more general look into the retort-house and coal-stores before leaving them for other parts of these important new works. One matter which strikes the visitor, perhaps more so than those who have been identified with the construction of the works from the beginning, is the splendid light which exists in all parts of the retort-house; and this is attributable more than to any other provision to the use of Rendle's glazing for the raised ventilator of the roof. Through this glazed portion of the roof, which is, of course, situated directly over the bench, light descends through the wide openings left for the coke in the stage-floor; and never has a closed-in basement to a retort-house been seen that is lighted in a manner superior to this one. The same system of lighting the coal-stores has been adopted. There is another point about it worth notice. It was stated in the previous articles that this house is close on the sea-shore, that it is exposed to violent gales, and that special precautions had to be taken in designing the roof, to guard against damage. Several engineers who read the articles, and some who have seen the house, shook their heads over the temerity of Mr. Botley in so constructing and glazing this raised portion of the roof; and there were predictions that a good gale would bring repentance. It has been in position now some eighteen months. Heavy gales have come and gone; but the glazed ventilator stands unshaken and unscathed. Only one little difficulty has been found on the seaward side of it; and that is during tempestuous weather, the rain has been driven in along that side. The construction of the roof, however, has permitted of wooden louvres being affixed on the troublesome side; and this work is now approaching completion. So far as it has been carried, it has proved itself to be a perfect remedy. Another thing about the house and the coal-stores which can be appreciated more now that the interior work is in position than it could be when only the buildings themselves were erected, is the ready direct through and through accessibility of all parts, besides which it is noticed that, in many situations in the outer and partition walls, there are archways simply filled in with 4½-inch brickwork, which can be rapidly knocked away, for any emergent or temporary requirement, without injury to the main structure. The stage-floors are broad, and will afford good passage way even when the machines are at work. Altogether the airiness and lightness of the whole place thus gives one a feeling of freedom. It is observed that in one corner of the basement at the east-end, there has been located a gas-engine and air-compressor (together with a large mortar mill) for temporary purposes until the power house is completed—fig 1. At the present time a 3-inch wrought-iron pipe conveys the compressed air to the Shone chamber situated at a distant part of the works, for raising the sewage into the Bexhill sewerage system. With this mortar mill, Mr. Botley has been making some splendid wall plaster from ground clinker.

The inspection in and about the retort-house (which is the first of the three projected houses of a productive power of 2 millions each) has furnished so much interesting material that the notes supplementing the information already published about the remainder of the works must be reserved for treatment in our next issue.

ANDERSON ON COKE.

SOME few years ago we reviewed a useful little book in which Dr. Anderson, of the University of Glasgow, had put into English the work on the chemistry of coke of Oscar Simmersbach, the Manager of the blast-furnace department of the Upper Silesia Iron and Coal Company. This was the only handbook dealing specially and principally with the subject to which makers of coke could turn for information on the chemistry of the product. A fresh edition of the work has been called for,* and Dr. Anderson has taken advantage of the opportunity to bring the matter up to date—not forgetting to mention the "arsenic scare" of 1900. The growth of the coke industry alone would amply warrant this attention to the science of coking, altogether apart from the remarkable lack of precise knowledge concerning the nature of the process, which is a powerful incentive to inquiry.

It is a curious reflection that at this time of day the University of Glasgow should be ignorant of the change produced in the composition of coals by weathering at ordinary temperatures. Weathering is supposed to injuriously affect the coking property of coals; but not invariably. In the operation of coking, moreover, the quicker the application of the heat the harder the coke, as a rule. On the other hand, some very highly bituminous coals swell up so quickly under heat, that they do not make good coke at all in exteriorly-heated retorts, but coke best in the old-fashioned beehive ovens. Thus the kind of coal prescribes the type of oven or retort to be used in the coking. This process is progressive in all cases, beginning with the portions of the charge in contact with the heated retort surfaces. The steam and the occluded gases come off first, the volumes of smoke that pour out before the lids are closed being due to the partial burning of a small quantity of the dust of the coal. It is not until the temperature of melting is attained, which is about 315° C., that gas properly so called begins to come off. As it takes time for even a small quantity of coal to reach this temperature, the actual loss of gas during the stage of charging is nothing like so large as the attendant "smother" would lead a spectator to suppose. Hence it is there is no real reason for hurrying over charging to the sacrifice of other and more important results. Though the coking process is finished when flaming ceases, the distillation is not by any means finished at the same time. Generally speaking, the latter process never is completed in the coking oven or retort, as the temperature is not high enough. It is only at the temperature of the blast-furnace that coke can be entirely freed from volatile matter. After the initial swelling up of the charge, which ceases at about 600° C., the coke continuously shrinks until the distillation is effected. The quenching process does not alter either the bulk of the coke or the size of the pores. If the charge can be

* "The Chemistry of Coke." By W. Carrick Anderson, M.A., D.Sc. Glasgow and Edinburgh: William Hodge and Co.; 1904.

levelled and compressed, so much the better. A bright, silvery-grey colour seems to be the peculiar attraction of beehive oven coke. Dr. Anderson admits that gas coke is a substance essentially different from metallurgical coke; the former being a bye-product, whereas the latter is the chief result aimed at by the manufacturer.

Full particulars are given of the best methods to be followed in analyzing coke and coal; and, altogether, this is a useful little book.

OBITUARY.

FREDERICK GEORGE DEXTER.

By a Personal Friend.

There is always a feeling of sadness and regret in connection with a funeral, especially that of a young or middle aged individual—the young may die, the old must. This emotion was more than usually evident among the silent, sad-faced crowd assembled at the West Hill Cemetery on Tuesday last, braving the discomforts of a steady, chilly rain, in order to express their esteem and respect for the late Manager of the Winchester Water and Gas Works, by taking part in the last rites. The circumstances in connection with his untimely decease—he was removed from a sphere of usefulness and activity that he had occupied for fourteen years with credit to himself and benefit to all concerned at the comparatively early age of 40 years—were briefly stated last week (p. 507), and are more fully noticed in another column to-day. We may here allude, with as much satisfaction as it is possible to experience in connection with such a deplorable event, to the kindness and good feeling that were evidenced by the Chairman of the Winchester Water and Gas Company, the Coroner, and the Jury in the course of the judicial inquiry, and by the sympathetic attitude at the funeral. The attendance included Directors, the principal officials, and most of the employees of the Gas and Water Company, besides personal and professional friends; and the ceremony passed off in a manner acceptable to the bereaved relatives, and to those who in course of business or pleasure had been friends or associates of the deceased.

The late Mr. Dexter was a steady, painstaking worker, who spared no time or trouble in keeping well in advance as regards every detail of his profession, and freely placed the results of his labours at the disposal of his *confrères*. He commenced his career by accepting an appointment at Wormwood Scrubbs, under Mr. C. E. Botley, at that time Gas Engineer to the Great Western Railway Company; and while occupying this position, he contributed a paper to the 1886 meeting of the Gas Institute on "The Relative Values of Tar and Coke for Retort Firing," which was an elaborate and well-worked theoretical investigation into the principles concerned in a question which at that date was exciting a great deal of interest. Subsequently, he became Manager at Wantage; and in 1890 he was appointed Assistant to Mr. W. Upton Tinney at Winchester, and on the death of that gentleman in 1892 was chosen as his successor.

In that year, he again came before the Gas Institute with a paper on "Steam as an Aid to the Revivification of Oxide of Iron *in Situ*," and again displayed a sound grasp of chemical theory and engineering practice. A paper on "A Season's Experience with Incandescent Public Lighting," read in 1896, attracted a great deal of attention as one of the earliest applications of that system, which is now almost universally adopted; and in 1899 an interesting communication on the influence of carbonic acid in connection with the combustion of coal and water gas was presented. Mr. Dexter was also a regular attendant at the meetings of the South-West of England District Association of Gas Managers and of the Southern Association, and frequently presented contributions to the proceedings. He occupied the presidential chair of the first-named Association in 1895, and delivered a carefully-prepared Inaugural Address. Other papers that might be mentioned were: "A Method of Increasing the Consumption of Gas for Cooking and Heating Purposes" and "Incandescent Gas Lighting." He was no mere arm-chair philosopher, but regarded study as a preliminary for active work, with the result that, in connection with all modern developments—such as incandescent lighting and maintenance, slot meters, cookers, and free fittings—he occupied a foremost position, and did a great deal of useful pioneering work. He took a keen delight in overcoming difficulties; and numerous little details are to be seen at the works (where he had extraordinary difficulties to deal with on account of limited ground area), and on the street-lamps, which were devised by him as occasion arose. The disc and wire for controlling the incandescent burner, instead of the usual chain and ring, furnish an instance in point.

Being of an unassuming and retiring disposition, he was seen to the best advantage on his own ground, on the occasion of a special visit to discuss any little point of difficulty. Many in the neighbourhood did not hesitate to resort to Winchester for this purpose—being sure of a friendly welcome—or for seeing what was going on in the way of exhibitions, demonstrations, or other methods for educating consumers or popularizing gas. What are they doing at Winchester? became almost a byword in the district, and a visit there was sure to be suggestive and useful. Many of the leaflets or forms devised for use in Winchester have been found so effective that they have been adopted entire, or with slight modification, at other works. There is a very widespread feeling of profound regret, especially throughout the southern district, that such a bright, promising, and active career should have had such a sad and premature ending.

The recent death is announced of Mr. James Tonge, the Vice-Chairman of the Westhoughton Gas Company. Deceased had been connected for about fifty years with the Hulton Collieries, near Bolton; and he was the inventor of the hydraulic mining cartridge which won the gold medal of the Society of Arts last year. He was one of the founders and President of the Manchester Geological Society.

An old employee of the Plymouth and Stonehouse Gas Company has passed away in the person of Mr. W. J. Fitch. He was connected with the Company for nearly fifty years, and for a considerable portion of this time filled the office of Outdoor Superintendent. He retired from active work about six years ago. Mr. Fitch, who had attained the venerable age of 84, was well known and highly-respected in Plymouth. Among those who attended his funeral were Messrs. Percy S. Hoyte (Engineer), H. B. Heath (Secretary), H. R. Coles (Outdoor Superintendent), T. Gibbons, and others, representing the Company.

The death occurred on the 21st inst., at his residence at Carnoustie, at the age of 85, of Mr. Alexander Millar, who was formerly the Manager of the gas-works in that town. Though deceased was somewhat feeble, he was able to leave his house until the Thursday before his death. It was in 1866 that he obtained the managership, succeeding Mr. J. Gemlow on the latter being appointed Engineer and Manager of the Cupar Fife Gas-Works. On his retirement in 1889, he was presented with a handsome gratuity by his employers, as a token of their confidence and esteem. It is worthy of note that Mr. Millar's death breaks the continuity of the living local gas managers, as up till the day of his decease all the five who since the introduction of gas 49 years ago have held the position were alive.

We regret to record the recent death of Mr. Alfred Thomas, latterly of Alresford, Hants, which took place at his residence after several weeks' illness. His career extended over about fifty years; and among the towns where he filled the position of Gas Manager were Diss, Ely, Alton, Basingstoke, and West Cowes. He resigned the managership of the last-named place on the transfer of the gas-works to the Urban District Council in 1897. His name was well known in connection with a number of patents which he took out for improvements in gas plant. He leaves three sons in the gas profession. The eldest is Manager and Secretary of the Wellington (Somerset) Gas Company; the second is Manager of the Seattle (U.S.A.) Gas and Electricity Company; the youngest is Manager of the Lymington Gas Company.

We regret to record the death last week, in his 78th year, of Herr Friedrich Siemens, who will be remembered by a large number of our readers as the inventor of the regenerative gas-lamp bearing his name, as well as of a regenerative and a glass-refining furnace. Deceased was born near Lubeck, and was one of a family of ten, several of whom—notably the late Sir William Siemens—became famous in the world of science and industry. He was for some time associated with his brother William, who had founded the Landore Siemens Steel-Works; but on the death of another brother—Hans—in 1867, he took over the glass-works started by the former in Dresden, and not only developed them into the most important establishment of the kind in Germany, but also founded glass manufactories in London, Berlin, and Vienna. With regard to the invention which closely connects him with the gas industry, his first lamp was followed by an improved high-power burner. which could be used in places for which the other was not suitable. It was described and illustrated in the "Journal" for April 29, 1884. The principle on which it was constructed was that the heat generated was arrested and imparted to the current of air required to effect combustion, with the result of a gain of 40 per cent. in the amount of light yielded. At the meeting of the Gas Institute the following year, Herr Siemens read a paper "On Distributing Light and Heat, and Supplying Heated Air to Ordinary Gas-Burners," for which he was awarded the Institute's third premium. The Siemens burner was at the time a distinct advance in lighting appliances; but its duty will, of course, not bear comparison with the more modern incandescent burner and mantle.

Inventions and Patents in the Past Year.—The report of the Comptroller-General of Patents for 1903 shows that the number of patents applied for was 28,832, which is 142 less than the number in the preceding year. There is a general increase in the applications for patents concerning air and gas engines and locomotives, and especially in the electrical classes. Penny-in-the-slot machines are among the patented appliances in which a falling-off is shown.

Atomic Weights of Oxygen and Hydrogen and their Atomic Relation.—In a recent number of the "Comptes Rendus," MM. Guye and Mallet dealt with the subject of the atomic weights of oxygen and hydrogen and the probable value of their atomic relation. The final value resulting from the authors' determinations is: O = 15·8787 given H = 1, or H = 1·00764 for O = 16 (with an error of 1/80,000 only on the most discordant of the mean values). The weight of a litre of normal oxygen (1·42886 grammes) and of hydrogen (0·089875 gramme) was also determined.

THE SCOTTISH JUNIOR GAS ASSOCIATION.

Formation of an Eastern District Association.

Last Saturday evening a meeting was held in the Heriot-Watt College, Edinburgh, to consider the question of the formation of a District Association in connection with the Scottish Junior Gas Association. Mr. W. R. HERRING presided over an attendance of about forty gentlemen, among whom were Mr. A. Wilson, of Glasgow, Mr. James Lowe, of Glasgow (the President of the Western District Association), Mr. W. M'Crae, of Falkirk, and Mr. H. O'Connor, of Edinburgh.

The CHAIRMAN said the object of the gathering was to form a Junior Gas Association for the East of Scotland. It would be in their memory that a meeting was held in Edinburgh, under the presidency of Mr. Wilson, of Glasgow, at which the matter was discussed. More recently a meeting was convened in Glasgow, at which an Association for the Western District was duly formed (*ante*, p. 381); and he understood that the membership was now upwards of a hundred. He might say that these Junior Gas Associations were, comparatively speaking, of recent growth. There were three existing in England, and he believed they were doing very good work; and he did not see why they in Scotland should be behind England. It was the case that a good many of those who were members of the Junior Associations were eligible as associate members of the larger organizations connected with the gas industry; but there was the disadvantage attending this, that the juniors who might belong to the Senior Associations very seldom had the opportunity of being present at the meetings, because the seniors wished to do so, and the juniors had to stay at home to do the work. From this, they would see that if the juniors joined the larger Associations, almost the only privilege they would have would be that of paying their subscriptions. He did not see that they got much more out of it, because they could derive from the Technical Press all the benefit of the technical matters contributed at the meetings. If the juniors formed an Association for themselves, they would have opportunities of meeting and speaking, probably with less restraint than when their governors were present; and there was no doubt that they would add considerably to the *technique* of the profession. He ought to point out that the use of the word "junior" had nothing whatever to do with the age of the members, but was rather intended to refer to juniors in position. It stood to reason that in the gas profession, as in all other walks of life, there were only a few chief positions and a great many junior ones; and the object of the Association was to bring the juniors together, to give them more confidence in themselves, and to fit them to step forward and fill the senior positions as they became vacant. There were a good many first-class men in gas-works who could add a great deal to such meetings, which would be of considerable value, not only to the juniors themselves, but also to the senior members of the profession. The scope of the Association was set forth in the print which had been distributed. It would be seen that the principal object was very materially to assist in the education and advancement of any person who might become associated with the Association, and who took an active part in its work. They must see that the advantages were manifold. Seniors were sometimes asked to recommend somebody for a post. They had a number of applications put before them, some of which looked very well, while others, perhaps, did not. But they were obliged to make a selection. They had no idea whether they had got the right man at the finish; it was quite a matter of chance. What he wished particularly to point out was that, assuming that a young man took an active part in such an Association, prepared a paper for it—not an elaborate literary production, nor a highly technical discourse—on a particular subject, closely allied to the industry, and he mentioned that in his application, it could be referred to, and from it could be gathered whether or not the young man knew his business. Though the paper might be confined to one particular branch of the business, it could be reasonably inferred, from the way the writer handled it, that if he was master of that little bit he had mastered the rest; and he (the Chairman) would give that man the preference over another who might not have done any such work. It would also help members to learn to speak in public; and to express themselves so that those whom they were addressing would understand them, which was absolutely necessary for any man who was to fill a senior position. All of these advantages they could get by close intercourse among themselves, and by reading papers and having discussions. He was quite sure that those who might take an active part in such an Association would, in after life, bless the day when they joined it and put their efforts into it. He therefore had much pleasure in moving—"That a Junior Gas Association be formed, to be entitled the Eastern District, as distinct from the Western District."

The motion was carried unanimously.

Mr. H. O'CONNOR raised the question of whether the name should be "Eastern Branch" or "Eastern District." He thought the latter preferable.

The CHAIRMAN pointed out that "Branch" meant affiliation, whereas "District" did not.

Mr. A. WILSON said the idea in the West was to have separate Associations, working together.

It was agreed to call the Association the "Eastern District."

On the question of the qualifications of members,

The CHAIRMAN said that they must necessarily be very broad, and it was essential that the meeting should weigh almost every word in the proposal before them.

Mr. W. M'CRAE said that when the rules were being considered by the Western District, he raised the question as to the words "or at present being trained as an engineer or chemist, with the intention of being engaged in any of these industries." The question was whether the words "as an engineer or chemist" would make eligible for membership young men employed in gas engineering works, or being trained as carbonizing specialists, or in any such way; and Mr. Wilson made it perfectly clear at the time that the word "engineer" was intended to cover all these things. But, on thinking over the matter since, it had occurred to him that there might be cases of young men who were neither engineers nor chemists, but who were training themselves technically, and who would be perfectly eligible for membership if the rule were worded differently. He considered it would be in the interests of the Association that, while the membership was going to be strictly guarded, this clause should be made rather broader, and for this purpose he would suggest that the words "as an engineer or chemist" should be deleted. It would then read "or at present being trained with the intention," &c. He did not think this would interfere in the slightest with the confinement of the membership in the manner in which they all desired it to be, but would make it broader; and in his opinion it would be in the interest of the Association if it were so.

Mr. LOWE said he preferred the clause as it stood. The Junior Gas Associations in England had a rule which was very much more stringent. They did not admit anyone who was at present being trained for the industry; whereas they in Scotland intended to admit them. While it would make no real difference to leave out the words indicated, because they intended to give a liberal interpretation to the rule, still he thought "engineer or chemist" might be retained, because there were clerks and others in the coal trade who might wish to join. In fact, they had already received several applications from men so engaged, and they would come up at the next meeting of the Council. He did not consider that these persons were eligible. He preferred to keep the technical character of the membership to the front. Another point was that they were allowing to come in clerks and others who were in the service of corporations or companies; and they might find it wiser to draw the line at clerks who were not in such service.

The CHAIRMAN said it occurred to him that the provision rather shut out those who were being trained for the profession on the commercial side.

Mr. A. WILSON pointed out that clerks in service would come in under the head of "distribution."

Mr. M'CRAE said at the present time they were all at one regarding the interpretation of the clause; but it might be the cause of some controversy in the future. By taking out the words, it might make the matter clearer.

The CHAIRMAN thought that perhaps the rule was best as it stood. They must not allow the Association to get mixed up with traders—men who might come into the Association, not with the object of advancing the technical part of the work, and not even with the ability to do so, but merely seeking to further their own commercial interests.

Mr. J. DAVIE (Edinburgh) raised the question of whether traders would be excluded from the class of honorary members, because he knew of some engaged in the meter trade who could give a good paper.

Mr. WILSON said that while these gentlemen would be debarred from membership, there would not be the slightest objection to their giving them a paper or a lecture.

Mr. DAVIE said this suited his idea entirely.

The rule was then adopted unanimously, as were all the others following. They are exactly similar to those agreed to by the Western District Association at their meeting in Glasgow.

The following were then elected as officers of the Eastern District Association:—

President.—Mr. A. Masterton, Assistant Manager, Edinburgh.
Vice-President.—Mr. James Dickson, Assistant, Dunfermline.
Hon. Secretary and Treasurer.—Mr. Henry Rule, Assistant, Falkirk.
Members of Council (three from Edinburgh and three from the districts).—Messrs. J. T. A. Taylor, Granton Works, Edinburgh; W. Blair, of James Milne and Son, Limited, Edinburgh; H. H. Gracie, Granton Works; W. Brown, Manager, Lasswade Gas Company; T. O'Neill, Manager, Dunbar Corporation Gas-Works; and W. Young, Manager, Penicuik Gas Company.

Mr. DICKSON asked if the Association would cover the Dundee district. When the last meeting was held in Edinburgh, he was in that district, and was requested to communicate with gentlemen there on the subject. He did so, and received several replies. Mr. A. Yuill wrote that he considered the proposal a commendable one, and that they might depend upon his co-operation in any way which the Committee might deem advisable. Since then he had been to Dunfermline; and he should like to know what was to be done with the Dundee district.

On the suggestion of the CHAIRMAN, it was agreed that the Hon. Secretary should communicate with gentlemen in that district.

This course would give them the option of forming a separate Association or joining the Eastern District.

Mr. WILSON proposed a vote of thanks to Mr. Herring for presiding. He congratulated them upon their success in forming an Association, and said he thought that circumstances augured well for the future. To his mind there was another side of the question than the benefit to the members themselves, and that was the benefit to the industry. The more members they could get into the Association, the better able would they be to bring before the public what they could do for them.

The CHAIRMAN, in acknowledging the vote, said he was pleased to have been present, and to have rendered what assistance he could in furthering the object of the meeting.

Mr. MASTERTON said he considered it not only a duty to accept office, but a great pleasure to have been so cordially elected the first President. They might rest assured that he would do his best to promote the interests of the Association, and to make it a successful enterprise.

A vote of thanks to Mr. Wilson for the efforts he had made to form an Association having been agreed to,

The CHAIRMAN said he wished to say that Mr. Wilson had taken a most active and enthusiastic interest in the formation of the Association. He would like also to mention Mr. O'Connor, who, he said, took up the suggestion with the enthusiasm he displayed in everything he touched; and probably more of the success of the movement was due to him than to anybody else. He therefore moved a most hearty vote of thanks to Mr. O'Connor.

This having been accorded,

Mr. O'CONNOR returned thanks. His interest in the Association, he said, was principally started by the fact that a number of his students were anxious for such an organization as was now suggested to be formed.

The proceedings then closed.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Annual Meeting—The Question-Box.

The Annual Meeting of this Association was held on Friday, at the Regent Street Polytechnic; the chair being occupied by Mr. R. H. BROWN, Vice-President, in the unavoidable absence of the President (Mr. Walter Grafton).

The ballot for the officers and Council for the ensuing year, resulted as follows: President, Mr. Walter Grafton. Vice-Presidents, Mr. R. H. Brown and Mr. F. D. Richmond. Members of Council, Messrs. O. W. Dougan, W. J. Liberty, W. Upton, F. Ainsworth, R. H. Chree, and W. E. Dean. Auditor, Mr. W. H. Bennett. Secretary and Treasurer, Mr. P. F. Scarth.

Mr. Richmond, in proposing a very hearty vote of thanks to Mr. Scarth for his labours on behalf of the Association, remarked that the position of Secretary must seem a rather hopeless one sometimes, when they had such small assemblages, in spite of their large membership. This having been carried unanimously, Mr. Ainsworth said he thought they ought not to forget the President, who had not been able to attend the last two meetings. He proposed that the Secretary should write and tender to Mr. Grafton the sincere thanks of the members for the help he had given in various ways to the Association. Mr. Chree, in seconding, stated that he had always found the President kindness itself, particularly to juniors and those who were anxious for assistance. He was never backward in settling any technical difficulties, and had done a great deal for the rising generation of the gas profession. This also was agreed to. Mr. Scarth, in returning thanks for the vote accorded to him, said it was a pleasure to do the work of the Association; but, at the same time, it would be a still greater pleasure if some of the members would take more interest in the proceedings, and so enable things to go with a swing.

Another matter which was dealt with was a proposal to award premiums to the readers of papers and speakers in the discussions. It was agreed that a premium of the value of three guineas (in cash, books, or anything else the recipient might choose) should be awarded by the Council for what they judged to be the best paper read during the next session; and also that a premium of two guineas should be given to the member whom the Council held to be the best debater. This step was decided upon in consequence of the Association being in a good financial position, as well as with the view of creating more interest in the proceedings and encouraging members to come forward with communications and remarks.

The discussion of the questions left over from the April meeting was then proceeded with; the first query considered being "What is a good system of burning breeze under a boiler? The present boiler is rather small for the work to be done; and large coke has therefore to be used to keep steam up." Mr. Brown said this was a very difficult question to answer without giving some furnaces a gratuitous advertisement; but there were many systems of burning breeze under a boiler. The great thing was the capital outlay. To put Meldrum furnaces under a Lancashire boiler cost about £65, and Wilton's furnace cost some £45; while there were one or two cheaper arrangements—those that were made by Richards and Cleeves and Grainger both costing about £30. There was also another grate made by Bryan Donkin and Co., with which a fan was used to create a draught. All these were very good; but considering the capital cost of the various systems, he thought that Wilton's was one of the best, because it was more on the principle of a regenerator setting. Of course, these arrangements were excellent in days gone by; but so many of them had been put in that the price of pan breeze had been increased from next to nothing to about 7s. or 8s. per ton. In view, however, of the fact that in the present instance the boiler was rather small, one of these furnaces would, he should think, be a very good investment. With common slack coal in an ordinary grate, it is difficult to get 30 lbs. of steam; whereas with the same boiler and a Wilton's furnace it would be easy to reach and maintain 60 lbs. Mr. Bennett doubted whether, if the boiler was already too small, it would be worth while going to the extra expense; because if the business was increasing, it might be better to put in a new boiler. The cost of a boiler was not so very great. Mr. Brown: You can easily increase the pressure from 30 lbs. to 60 lbs. without doing the boiler or engine very much harm. Mr. Scarth remarked that they must first of all see whether they could get the breeze. In answer to a question as to what pan breeze was, Mr. Richmond said strictly speaking it was clinker breeze from under the generators. This was generally picked over; the small lumps of coke being used for the boiler, and the residue sold for making roads, &c. There was another reason for using forced draught in some works, where there was a lot of pan breeze which could not be got rid of. Mr. Brown remarked that round about London it was very difficult to obtain breeze at anything like a reasonable figure. These furnaces had sent the price of low-grade fuel up from practically nothing to anything from 5s. to 10s. a ton. Mr. Richmond said that, besides the arrangements mentioned, there was a patent grate-bar, which created an upward current. This was cheap—a matter of £4 or £5 would fit the bar up; but he did not say that it was so efficient as the furnaces named.

Question No. 12 was: "What must be the price of tar to allow of its being burnt under a boiler, and how does it compare with coke for efficiency?" Mr. Scarth pointed out that they burnt water-gas tar in this way at Beckton. Mr. Richmond said that it fetched the same price as coal-gas tar, and he thought people liked it better. There was a good deal more in water-gas tar than "met the eye." There was, of course, a rather big percentage of water in it; and this had to be allowed for. Mr. Brown: If you burn it under a boiler, you have to burn the water to steam. Mr. Chree said he was not in a position to mention the relative price; but he knew an instance in which liquid fuel was used—and he believed was found to answer very satisfactorily—on the Hydroleum principle. In this case water-gas tar was used; and the water was first separated by an arrangement of steam coils inside a small tank. It was found that if the tar was kept at a temperature of (say) between 80° and 85°, the water separated out. There was, however, one thing in connection with liquid fuel firing—it was necessary to consider what sort of smoke was coming out of the chimney-shaft. If they were not careful, they might get complaints; but providing they had their mixture properly adjusted, there should not be any trouble in this respect. The arrangement to which he had referred for the preparation of water-gas tar for burning also had the effect of separating the fluffy stuff which was sometimes noticed in this tar. He did not know its composition; but it was very detrimental to the burners. This fluff separated out with the water, leaving the pure tar for burning.

On the next question—"Does the burr left on service-pipes after cutting interfere with the flow of gas; and is it advisable to remove the burr?"—Mr. Scarth remarked that if a pipe was at all exposed, the existence of burr on it would facilitate the formation of naphthalene. Mr. Richmond agreed that this was so; any obstruction would cause naphthalene to gather. Mr. Ainsworth said that at Winchester they had to be very particular, because naphthalene was extremely troublesome. He never knew a place with so much; and when he was there, he was very careful that the pipes were kept perfectly smooth. Mr. Richmond was of opinion that it would be a good thing if all service-pipes could be smooth bored inside. They were to be had so made, but not, he thought, in any size less than 2 inches. In the ordinary service-pipe, he found a certain roughness which was a "dust-bin" for naphthalene. In a long pipe, of course, there might easily be roughness which was not noticed. Mr. Ainsworth said that every good fitter would examine the condition of pipes in this respect, for his own sake. This should be done in the store. Mr. Liberty: You are entirely in the hands of your fitter. Mr. Ainsworth remarked that in Winchester if one fitter saw another cut a pipe without examining it, he would speak to him about the matter. Mr. Liberty said his advice was, By all means remove the burr, and make the pipe as smooth as you possibly can.

The next question put to the meeting was: "Is there anything as good as lead for jointing mains; and can any member give experiences of testing some of the compounds that have been put on the market at various times?" Mr. Chree said he thought that they might take it that if there had been anything at all in these various compounds, they would certainly be known and recognized; so that the answer to the question should be that they relied upon the old lead. This was used extensively at the present

time; and it would want a lot of getting rid of or displacing. Mr. Bennett remarked that if they did not want to use lead, they could have turned-and-bored joints. Mr. Richmond pointed out that even in this case lead should be used. In these days of steam-rollers, they wanted something a little bit better than ramming home. He had used turned and bored joints; but he always employed also a small amount of lead. Spun yarn, however, would be dispensed with. Then, again, with turned-and-bored joints it was necessary to go straight; they could not swerve a little. Mr. Brown said that for pipes laid under a river turned-and-bored joints were used; but these were of special construction—more of the nature of a swivel joint. Mr. Bennett remarked that he had seen half a mile of main paid out from a lighter in Amsterdam; but Mr. Richmond said that this was a special arrangement, and not the ordinary turned-and-bored joint.

With reference to the query: "Is it better to have few and thick layers of purifying material or many and thin, and why?" Mr. Brown said the general practice was to have thin layers, though one or two well-known engineers preferred few and thick ones. Mr. Bennett said that at his works they had two layers; and their purifying costs were about ¼d. per ton. Mr. Richmond: You are not under the sulphur clauses. Mr. Bennett (continuing) stated that they employed all oxide, and had no trouble with back-pressure. The size of the purifiers was about 21 feet by 14 feet. Each layer was nearly 2 feet thick—certainly they would not be less than 18 inches—using precipitated oxide. Mr. Brown said he was acquainted with one prominent engineer who was very fond of few and thick layers; but he believed that throughout the country the majority would be found to favour many and thin layers.

The next question dealt with the same stage of the manufacturing process—"Is there any difference between admitting the gas at the top of the purifying material to admitting it at the bottom?" Mr. Bennett took it that it was easier to do so at the bottom, and Mr. Scarth thought the same. In speaking of the bottom, it was agreed that the middle of the bottom was meant; while by the top, the top of the first layer was intended, so that the gas would force its way down instead of coming up through the purifying material. Mr. Chree said there was no difficulty in the matter at all. He happened to know of a works where more often than not the gas was put in at the top of a purifier for convenience sake. The pressure was not altered at all, which was the main point. If it was more difficult to work in this way, the fact would show itself in the pressure; but there was no difference in the pressure thrown by a purifier when the gas was put in at the top of the top layer, from what was the case when it was introduced at the bottom of the bottom layer.

Question No. 17 was: "The present holder gives only 2 inches pressure; but owing to extension of the district, this is not sufficient. How can it be increased?" Mr. Scarth said one way was to weight the holder; while another was to employ a fan. In fact, many methods might be devised. He had seen plates put right round the top curb, and also a crane chain placed on in the same way. Mr. Brown remarked that any weights would do, so long as they were equally distributed; and Mr. Richmond suggested that old retort mouthpieces could be used in this way. Mr. Chree pointed out that in some large works they boostered direct on the district; but he thought this was a mistake. At the present time, one of the great advantages that gas possessed over electricity was that the supply was more reliable; and if they were distributing at a high pressure by the aid of a fan, and the belt slipped, they would be placed in a serious position. He did not think that gas engineers could afford to throw away even an advantage such as he had referred to, in these days of keen competition. Mr. Brown pointed out that it was possible to use a direct-driven fan instead of a belt-actuated one; but Mr. Chree thought that by far the better way was to booster into—for preference—a large single-lift holder that had been weighted. He knew of a case in which this was done. The holder had had to be strengthened considerably both in the top plates and in the trussing. In this case, the weights had been put round the bottom curb, as well as all round the top, and provision made for further increasing the pressure. As a matter of fact, the holder threw 11½ inches. This was a special case, and the holder was an extremely old one; for, of course, the pressure named was nothing extraordinary.

It was agreed that the next query—"How much coal gas should a ton of oxide purify, using oxide only, and how much carburetted water gas?"—was very difficult to answer without further particulars. Several members pointed out that everything depended upon the coal and the oxide used.

In answer to the question "Can producer gas, such as that of the Mond process, be used for incandescent lighting, and if so in what way does it differ from ordinary gas?" Mr. Bennett drew attention to the fact that there were many public lighting systems in Germany supplied with gas made on the Dellwik principle. Mr. Richmond pointed out that they would, of course, use a greater quantity in proportion than they would of coal gas; while Mr. Chree added that a special burner and mantle would be required. It was, however, he said, quite a question whether they would get the length of flame. Mr. Ainsworth reminded the members that Professor Lewes had proved that it could be done. Mr. Richmond: You must have a great pressure.

The last question discussed was: "On a photometer fitted with a Methven screen, are the distances on the scale calculated from the source of light or from the slot in the screen; and if the latter, does the distance from the source of light to the slot have any effect on the results?" Mr. Grimm said the distances on the scale were calculated from the front of the silver slot—that was, the side of the slot nearest the disc-box; and the distance of the source of light from the slot would certainly have an effect on the results. Mr. Chree said the main point was: On what principle was the Methven system of testing based? Methven found that the intensity of light emitted from an argand burner was practically the same in the centre of the flame regardless of the illuminating power of the gas burnt; so that the distance between the slot and the flame must, in order to preserve this result, be such that the rays of light did not get beyond the centre of the flame. The distance had, he believed, been calculated by Methven. Mr. Clark said the question was, which was the centre. Practically speaking, neither the slot nor the centre of the argand was the centre. In fact, the centre of the illuminating source of the Dibdin screen varied with the distance it was from the disc. If they looked through an aperture, the nearer they approached the hole the more view they would see; and it was just the same with the Dibdin screen. All possibility of error was eliminated by having the distance fixed, which was perhaps the best way.

This concluded the session; and no further meetings will be held until the autumn.

EDISON ON THE GENESIS OF THE INCANDESCENT ELECTRIC LAMP.

The completion of nearly twenty-five years of existence of the incandescent electric lamp appeared to the Editor of the "Electrical World and Engineer" a fitting opportunity for presenting to the readers of that publication an account of the investigations which led to the production of what has now become a very generally used means of illumination. He accordingly suggested to Mr. T. A. Edison that he should furnish a personal narrative of the birth and development of the lamp. Mr. Edison complied, and from his story we make the following extracts.

My experiments on carbon began in 1876, when I had the idea of making carbon wire, &c., for various electrical and chemical purposes. In September of the following year, strips of carbonized paper were tried as an incandescent conductor suitable for use in lamps; and the work was followed up till January, 1878, when a breakdown in health necessitated a trip to California. On my return in August, we immediately set to work again in earnest. What we desired at that date, and had settled our minds upon as the only possible solution of the subdivision of the electric light, was that the lamps must have a high resistance and small radiating surface.

About December, 1878, I engaged as mathematician Mr. Francis R. Upton, who had lately studied under Helmholtz in Germany; and he helped me greatly in calculations of the multiple arc problem. Our figures proved that the lamp must have at least 100 ohms resistance to compete successfully with gas; for if the lamps were of low resistance, the cost of the copper main conductors would be so great as to render the system uneconomical and commercially impracticable. In this direction we tried platinum also. When working on incandescent platinum, we had procured a Sprengel mercury pump, and had ascertained that we could thus get exceedingly high vacua. It occurred to me that perhaps a filament of carbon could be made to stand in the sealed glass vessels or bulbs, which we were using, exhausted to a high vacuum. Separate lamps were made in this way independent of the air-pump, and in October, 1879, we made lamps of paper carbon, and with carbons of common sewing-thread, placed in a receiver or bulb formed entirely of glass, with the leading-in wires sealed in by fusion. The whole thing was exhausted by the Sprengel pump to nearly one-millionth of an atmosphere. These filaments of carbon, though naturally quite fragile owing to their length and small mass, had a smaller radiating surface and higher resistance than we dared hope. We had virtually reached the position and condition where the carbons were stable. In other words, the incandescent lamp as we know it to-day, in essentially all its particulars unchanged, had been born.

We began immediately to make vacuum pumps and to produce these paper filament lamps on them. In November that year, we made perhaps as many as a hundred of these lamps; and some had a remarkably long life. Each yielded from 12 to 16 candle power, and they were burned on chandeliers until they gave out. The average life was about 300 hours. One of them lasted 940 hours, and another 1350 hours; so that commercial success and a new industry were already well in sight. On Christmas Day, 1879, I had lighted up my laboratory, my offices, two or three houses about one-fifth of a mile from the dynamo plant, and some twenty street lights. On the last day of the year as many as 3000 people flocked out to Menlo Park to see for themselves the light. I am told that, on a moderate computation, the production of incandescent lamps in America since my first success has reached a total of 250 million lamps, or not less than 10 million a year for each of the twenty-five years. Essentially, the lamp has remained structurally the same ever since 1879, in the elements then demonstrated to be vital and necessary to commercial success.

GAS-ENGINES FOR PUMPING-STATIONS.

In the "JOURNAL" for March 22, reference was made to an article on this subject, by Mr. J. R. Bibbins, in "Cassier's Magazine," and some particulars were given of the gas-engine high-pressure pumping-station for fire purposes at Philadelphia, taken from a report made by Mr. F. L. Hand, the Chief of the Water Bureau. A recent number of the "Engineering Record" contained an illustrated description of the station, from which we make some extracts by way of supplementing what has already appeared.

The station supplies water at the necessary pressure up to 300 lbs. per square inch to a high-pressure pipe network covering the downtown business district, which has been designated by the insurance companies as the "congested" or "danger" district. The ultimate capacity of the station is approximately 3000 brake horse power, or 12,700 gallons of water per minute. Up to the present time, 2200-horse power in engine capacity has been installed, and the plant will be extended in future when required. The establishment of the station was directly brought about by the action of the insurance companies in raising their rates throughout the "danger" district; this movement being necessitated by the severe losses sustained owing to the lack of adequate fire-extinguishing apparatus.

The high-pressure piping system has been installed about two years, and was served by three fire-boats plying along the Delaware River front pending the completion of the central pumping-station. With these boats a pressure of 225 lbs. per square inch has been obtained upon the system at the most distant point, and results secured far superior to any that are possible with the present portable apparatus for dealing with fires. The aggregate capacity of the boat pumps is 9000 gallons per minute; and the three boats, with an average pressure of 180 lbs. at the pumps, have maintained twelve 1¼-inch streams, covering a horizontal distance of 150 feet. Four 2-inch streams were thrown 190 feet with a pressure of 237 lbs. at the pumps, and a single 2-inch stream was thrown 315 feet horizontal and 230 feet vertical distance with a pressure of 230 lbs. at the pumps. A loss of pressure of 47 per cent. with twelve streams and 34 per cent. with four streams was observed between the fire-boat and the hydrant; this loss occurring over a network of piping 1¾ miles in length from end to end. With the higher pressure available at the pumping-station, a corresponding increase in pressure at the hydrants will be available; thus enabling a greater number of streams to be kept going than before. The fire-boat service will not be discontinued, but will be maintained as an auxiliary to the gas pumping-station.

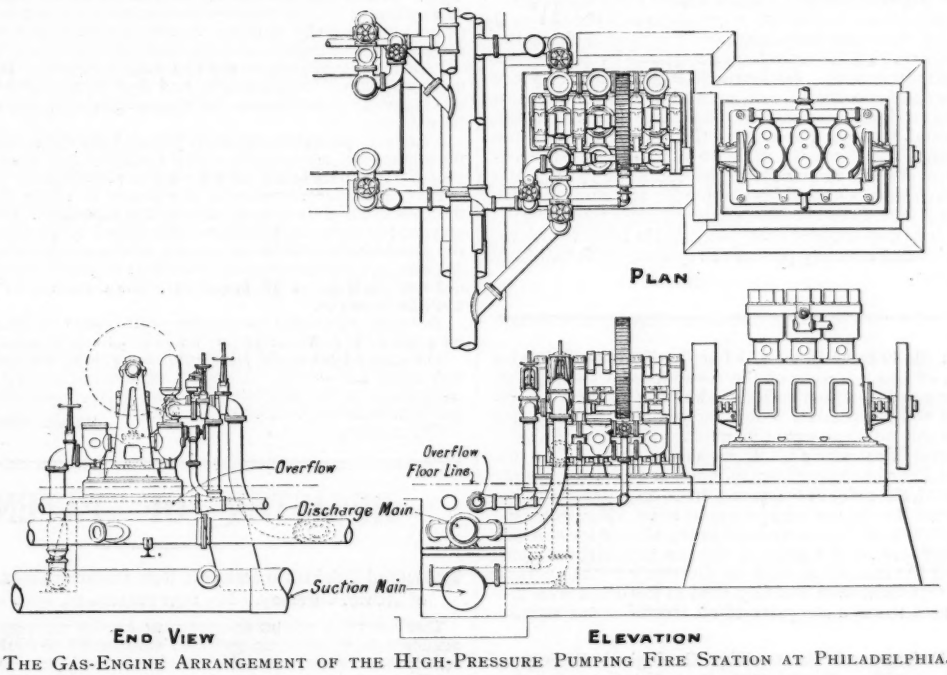
The comparative cost between a steam and a gas plant is well shown by the following extract from Mr. Hand's report:—

	Steam.		Gas.
Number of engines	3	..	8
Capacity in million gallons per 24 hours	15	..	16
Number of boilers	8	..	none
Cost of engines, boilers, and stack	$140,000	..	..
Cost of engines	..	..	$150,000
Wages per month	650	..	450
Cost of coal, at $2 per ton	500	..	..
,, gas, at $1 per 1000 cubic feet	..	..	392
,, fuel per hour	(50)	..	(39)
Oil, water, &c.	48	..	48
Repairs	85	..	85
Running expenses per month	1,283	..	975
Cost per annum	15,396	..	11,700
Saving in gas over steam plant	24 per cent.		
,, on basis of equal capacity	29 ,,		

In the foregoing figures, no fixed charges upon the station have been considered. Assuming interest at the rate of 5 per cent., and an average depreciation of 7½ per cent., a further saving of 21 per cent. on this item alone is realized. Thus a total saving of 50 per cent. in aggregate operating cost is secured by utilizing gas power instead of steam power.

Gas-engines were chosen for service in the pumping-station for a number of reasons. Primarily, the question of expense involved in the maintenance of a steam station is effectively solved by the use of gas power; secondly, the operation of the station is simplified to the extent that a complete boiler plant has been dispensed with; thirdly, engines of comparatively small capacity may be employed with the same economy and reliability as larger ones—thus enabling the entire capacity of the station to be subdivided among many power units. Electric motors supplied from the local electricity distributing system were at first considered for operating the pumping units. While this arrangement would, it was thought, provide the greatest convenience of operation, the liability of accident to the power-house and transmission line, and the fact that the fire service would be in the hands of independent bodies, prohibited the use of electric motors.

In locating the station, the site selected was considered most desirable, even at increased cost, on account of the loss in pressure avoided in the main connecting the station and the distributing network. The building faces the Delaware River, and, by



THE GAS-ENGINE ARRANGEMENT OF THE HIGH-PRESSURE PUMPING FIRE STATION AT PHILADELPHIA.

means of a trunk main, the five feeders extending west into the business district are directly supplied. It is approximately 130 feet by 68 feet in interior dimensions, of which about 115 feet are devoted to the engine-room, which is entirely clear of columns or other obstructions, and is served by a hand-operated travelling crane. In a basement are located the air compressors, air storage tanks, igniter generators, and heating apparatus. The general arrangement of the power units is shown in the accompanying plan. The engine-room accommodates ten 300-horse power units, of which seven are now installed; also two 125-horse power units, which form part of the present equipment. The foundations of the engines are of brick, extending to within 12 inches of the floor level. A tunnel 6 ft. wide and 9 ft. 6 in. in depth, runs the entire length of the engine-room, and contains the suction, discharge, and overflow piping.

The main pumping unit consists of an 18 in. by 22 in. 300-horse power Westinghouse three-cylinder gas-engine connected direct to an 11½ in. by 12 in. Deane single-reduction double-acting triplex pump. The pumps are located on the main aisle, in order to minimize the piping, and to enable the control-valves and indicating gauges to be more readily accessible, and kept in constant view of the operators. After the engines are started, the entire manipulation of the plant is taken care of at the pump end by means of these valves. The main engines on each side of the station are connected by an iron gallery, from which access to all the valves, regulators, igniter cabinets, and upper works of the

engines, is easily obtained. The pumps are connected to the engines by steel flanged couplings, and through a gear reduction of 5 to 1—giving relative normal speeds of 200 and 40 revolutions per minute respectively. An important aid in securing uniform discharge is the principle of speed regulation employed in the engines. The valve mechanism regularly admits a charge of explosive mixture of uniform quality to each cylinder, at every second downward stroke, which mixture is in turn ignited at each succeeding stroke. This secures an extremely uniform effort upon the crank-shaft.

The gas supply of the plant is drawn from a 20-inch trunk main one block distant from the station, which connects two large gasholders located respectively on the north and south sides of the city. The gas is furnished by the United Gas Improvement Company of Philadelphia, from their local distributing system, and is the ordinary illuminating gas. The average calorific value of the gas is 675 B.T.U. per cubic foot, as determined by both chemical and calorimetric tests at the Company's laboratory. A valve on the 16-inch street-main outside the station controls the entire supply. The supply-pipe to each engine is similarly controlled by a valve located at the junction of the branch and station mains. Gas is supplied to the engines at approximately atmospheric pressure, through automatic regulators inserted in each supply-pipe. The speed of the engine is regulated by a sensitive centrifugal governor, driven through gearing from the main shaft. This governor directly controls the quantity of mixture admitted to the cylinder by the mixing-valve. A duplicate set of igniters is supplied on the engine cylinders, so that if one fails the other may be thrown into service.

The engines are started by compressed air, at pressures that range from 150 to 200 lbs., by means of a very complete system of storage tanks located in the basement of the building. With the tanks full, at 200 lbs. pressure, sufficient air is available for starting up the entire station independently of the compressors. Air is supplied to the tanks by a duplicate set of two-stage compressors, each provided with an automatic relief-valve, which unloads the compressor when a discharge pressure of 200 lbs. is reached. After the valve operates, the compressor cylinders are bye-passed, so that the load drops to that of friction. As soon as the pressure falls below 200 lbs., however, the valve again automatically places the pump in action. Starting one main unit reduces the pressure in two tanks about 50 lbs., or in one battery of four tanks about 25 lbs.; so that the necessity for the starting of the compressors simultaneously with that of the first unit is not for the time being imperative.

A preliminary trial of the station, extending over six weeks, was made; and the Superintendent's record shows the following results: (1) Not more than 25 seconds required to obtain full speed at each unit. (2) Not more than 45 seconds required to obtain the full 300 lbs. pressure. (3) Seven minutes required for placing the entire seven units in service. (4) During the 36 days' trial, out of a total of upwards of 100 alarms, not more than four misses were made in getting a single unit started. In these four cases, the engineer neglected to open the engine throttle or turn on the ignition current. These results indicate that, even in the extreme case of a sudden demand for the total capacity of the plant, the average time required for placing the station in service is 60 seconds per unit, from the time of the signal from fire headquarters; and it is thus evident that one minute after the alarm full pressure is available at any part of the system, or the buildings connected thereto.

Increase in the Price of Mantles.—The Berlin Association for the protection of the interests of the incandescent gas-light industry have issued a communication intimating that the apprehensions which were expressed a few months ago to the effect that a considerable advance would be made in the price of nitrate of thorium have been verified. It is pointed out that as the Government of Brazil has now largely increased the export duty on monazite sand, the price of thorium nitrate has risen by 25 per cent., apart from the 15 per cent. augmentation which occurred last year without any similar movement in the charge for mantles. The present increase in the price of the raw material has, however, compelled the mantle makers in Germany to take action; and at a fully representative meeting held in Berlin, it was provisionally decided to raise the price of all incandescent mantles 20 per cent.

Flow of Underground Water.—The Geological Society of Belgium have issued a special memoir on the flow of underground waters in limestone regions. Having regard to the importance of determining the source of water used for drinking purposes, the underground course pursued by it, until it issues again in the form of springs, must, if possible, be ascertained. The use of colouring matters is generally regarded as the best means of determining the question, and especially with regard to the time occupied by the water in its transit through the strata. It is maintained that neither floating objects nor matters in suspension can afford so true a notion of the flow as substances in solution; but this must not augment the density. It is generally concluded that fluorescein, which is favoured by many hydrologists, will prove the existence of communication between two points, and will give the best approximate idea of the extent of the time taken in transit.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Houghton-le-Spring Gas-Works in the Past.

SIR,—I was a little surprised at the remarks made by "Truth Only," in your last issue, concerning the above; I feel sorry he hides his head under a bushel. I should have thought, as truth is fond of light, he would have had the courage to give his honest name. He certainly bears out a good deal of the truth of my remarks when he tells the story of the manager and collector getting in as much as would enable them to sit and drink as much as they chose. Where were the Directors, if any? Your correspondent's last remark is, saying the least, ungentlemanly. Will he put his finger upon anything wrong? I challenge him.

Well, now, my friend seems to know or pretends to know more about the above than anyone else. I would like to inform him that my statements were not a dream, but solid facts from the mouth of Mr. Meiklejohn, sen. They were not, as he infers, from one who dreamt it for him; and I am afraid, as everything then was in the background, so probably my friend was also in the background. I am sure Mr. Meiklejohn would never tell me a falsehood; and I think my own experience both in connection with Mr. Meiklejohn and the works goes much further than your correspondent—having been so long and so intimately connected with him.

Evidently, however, I have touched a sore spot, by his tone of writing, and strange that during my connection with these gas-works spread over several years I never saw but the one Director. The whole of my contracts were made as between Mr. Meiklejohn and myself. Where were the other Directors? And if a Board of Directors did exist, it speaks very badly for that Board to have left Mr. Meiklejohn to his own resources by never finding a penny towards them. I said a Board of the old Directors did turn up after Mr. Meiklejohn had done all—probably natural.

I am sorry my friend has tried to spoil Mr. Meiklejohn's good name, and behind a bush. I will be glad to continue the case but will not unless "Truth Only" divulges his real name and not take advantage of this remark.

ROBERT DEMPSTER.

Penmaenmawr, May 25, 1904.

Expenses of Managers Attending Institution Meetings.

SIR,—I am sure many provincial managers were interested in your leader headed "Local Authorities' Gas Managers, &c.," as there is no doubt the boot pinches a great number who wear it uncomplainingly. The Local Government Board Auditor for this district lays it down plainly: "That the only conferences for which he can allow expenses are meetings of urban district councils, and then only one member and the clerk, or two members without the clerk, can attend."

I hear this preached to my chairman annually. It is, therefore, useless applying for permission and a grant to attend the meeting of the Institution; and, under the circumstances, I, like others, refrain from joining.

I am not quarrelling with my job, as I get along comfortably with the auditor and my council; and, if the above rule were not in force, I should have no difficulty in obtaining an allowance.

There are other points under the system to which the attention of the Board could be drawn, such as the following: The sanitary inspector, before being discharged, can appeal to the Board. Why not the gas manager? A friend of mine, whose competence could not be disputed, got his discharge by a one vote majority, because his habits did not suit some of his employers, whose manner of living no one could be proud of.

The only objection I have to the audit system of the Local Government Board is that it makes my books look like a Chinese proclamation.

The salary I get would just permit my paying the annual subscription to the Institution; but, being situated in precisely the same circumstances as the manager you wrote about, I am sure I shall never see London unless I walk all the way.

"DICK WHITTINGTON."

May 21, 1904.

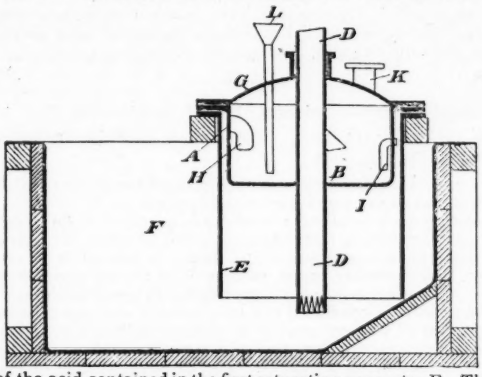
REGISTER OF PATENTS.

Recovery of Sulphate of Ammonia from Ammonia Gases.—Zimpell, K., of Stettin, Germany. No. 6891; March 22, 1904.

This invention relates to apparatus for the recovery of sulphate of ammonia from ammonia gases so constructed that the acid is constantly kept at the same degree of concentration. The patentee remarks that "the gases of ammonia are saturated with steam, so that it often happens that the acid is diluted by the condensed water of this steam. This happens the more easily the greater the surfaces are over which the gases of ammonia are conducted. The condensation of steam admixed with the gases of ammonia never occurs in the first saturating apparatus, as the heat liberated from the acid by the precipitation of the ammonia from the gases is greater than the heat required for preventing the steam from condensation. In the second saturating apparatus there is, however, only a small quantity of heat liberated—not sufficient to prevent the condensation of the steam, wherefrom results a continuous dilution of the acid."

The purpose of the invention is to prevent this condensation by means of the saturating apparatus shown on the opposite page. The second saturating vessel B is enclosed in a cylinder E of the main saturator, so that the waste gases coming from the first saturator F surround the saturating vessel B, and keep the walls heated to such a

degree that condensation of steam inside the vessel B is absolutely prevented. In the walls of the vessel B, near the upper edge, one or more openings A are provided, from which short bent pipes H project into the vessel B. An overflow I is provided, to keep the acid constantly at the same level. The cylinder E, as well as the vessel B, are closed by a cover G in which an overflow K for the gases and a funnel I for filling the acid into the vessel B are arranged. In the centre of the cover is a downwardly projecting feed pipe D, which reaches below the

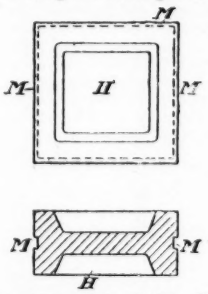


level of the acid contained in the first saturating apparatus F. Through this supply pipe the ammonia gases are supplied to the first saturating apparatus; the sulphate of ammonia being precipitated by the acid contained in it. The gases which have not been absorbed in the vessel F rise into the cylinder E, flow around the vessel B, and enter it through the openings A and bent pipes H respectively. The waste gases flow out from the vessel B through the outflow K.

Regenerator Furnaces.—West, J., of Southport. No. 6718; May 19, 1904.

This invention relates to the construction of regenerator furnaces of the type in which the waste gases are conducted through a series of horizontal flues leading to the chimney, and the secondary air supply to the combustion chamber is conducted through a series of horizontal passages built alongside the waste-gas flues, and divided from them by a partition wall, which becomes heated by contact with the waste gases—the heat passing through the partition wall imparting heat to the secondary air, and raising its temperature before meeting the producer gases. The wall between the waste-gas flues and the secondary air passages is constructed with fire-brick blocks of special section, "which do not resist the conductivity of heat through them to the same extent as ordinarily constructed solid brick or composite walls."

An illustration is given of a tranverse section of the furnace, a longitudinal section through the secondary air passages leading to the combustion chamber, and a longitudinal section through the waste-gas flues leading to the chimney flue. A cross section, side elevation, and sectional plan of the fire-brick blocks are also given, which, together with the ledge bricks for supporting the horizontal tiles of the secondary air passages and waste-gas flues, are built up to form a partition wall dividing the waste-gas flues from the secondary air passages.



The producer A has nostrils B, through which the producer gas passes into the combustion chamber C. D is the secondary air inlet, and D^1 D^2 are the passages through which the secondary air passes on its way to the combustion chamber, into which it enters through the nostrils E; and mixing with the hot producer gases complete combustion occurs. The waste heat from the setting is drawn by the draught of the chimney through the waste-gas flues F, F^1, F^2, and F^3 to the main flue G leading to the chimney.

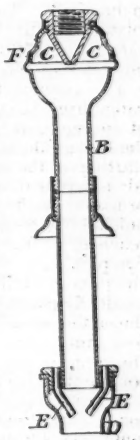
As is general with regenerator furnaces, the waste heat on its way to the main flue gives up some of its heat in heating the division wall dividing the waste-gas flues from the secondary air passages; and this wall acts as a heat conductor to the secondary air, for the purpose of increasing its temperature before entering the combustion chamber C. The secondary air in the example shown passes along the passages D^1 D^2 in a zig-zag course, to increase the length of time it is in contact with the division wall.

So far, this general description of the drawings agrees with the general construction of regenerator furnaces built with solid brick or composite tile division walls. But, instead of building the division walls of solid bricks or of several tiles laid side by side, "and which offer greater or less refractory resistance to the passage of heat according to the thickness of the wall," the patentee proposes to construct the wall of fire-brick blocks or tiles H, made thinner in the centre than at the edges, which are of sufficient width to have a wide base for building purpose and stability and to support the ledge bricks L; and the edges are formed with either tongues and grooves, or grooves M only, or combined tongues and grooves, for receiving the fire-clay when building the walls and making a tight joint between the blocks and the bricks. The fire-brick blocks H, being thinner in the centre, "offer less resistance to the heat than if the blocks were of uniform thickness; and, consequently, a greater amount of heat will pass through the wall from the waste-gas flues to the secondary air than if the wall was built with solid bricks or blocks of the usual thickness."

Inverted Gas-Burners.—Boult, A. J.; a communication from J. Braunstein, of Berlin. No. 14,080; June 24, 1903.

This is a modification of the inverted arrangement of burner described in patent No. 25,590 of 1901.

Gas entering through the upper nozzle is mixed in the tube B with air entering through holes C, preferably adjacent to the upper nozzle, and passes through the burner-head D to the burner. Small pipes E pass through the burner-head and are directed towards its centre to admit atmospheric air to the burner-head. A cap F, provided with holes corresponding to those around the upper nozzle, serves to enable the holes to be closed to a greater or lesser extent – thereby regulating the supply of air to the gas. The inlet nozzle is preferably of conical shape, so that there is only a small central opening for the passage of the gas.



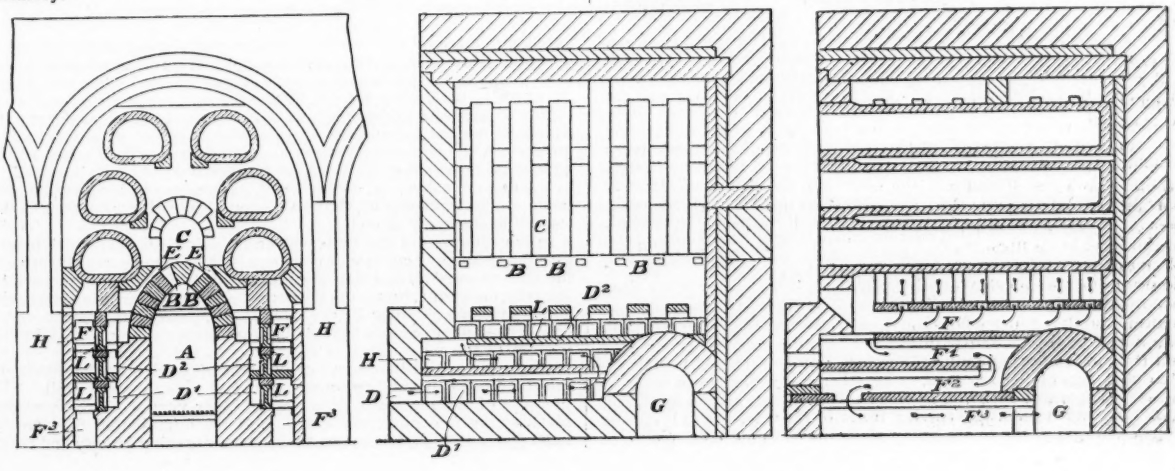
Manufacture of Gas.—Johnson, J. Y.; a communication from the Deutsche Continental Gasgesellschaft and Julius Bueb, of Dessau, Germany. No. 15,147; July 8, 1903.

The patentees claim a "process for obtaining a higher yield of gas and a better utilization of heat in the distillation of coal," by conducting the distillation in vertical retorts and dividing the operation into two stages in such a manner that when the gasification has been proceeding for some time, steam is passed in a vertical direction through the retort.

No illustrations are given of the apparatus they suggest should be employed in carrying out their invention. The text of the specification is as follows:—

"During the last stage of the dry distillation of coal, there is a considerable reduction in the yield of gas, and the gas then produced is of poorer illuminating quality; and although the production of gas diminishes, the same degree of heat is employed to heat the retort during the last stage as was used in the first stage of the distillation.

"The object of this invention is to carry out the manufacture of the gas in such a way that more and better gas is obtained, and the heat is better utilized than hitherto. We use for the gasification vertical, o approximately vertical, closed retorts; and we carry out the distillatoryr process in two stages—the first in which a considerable or the greater part of the coal is gasified, and the second stage after the yield of gas begins to decrease. During this second stage, steam is introduced at the lower part of the retort; the steam coming first into contact with the incandescent coke already distilled, and the gas thus produced combining with the portion of the charge in the middle of the retort, which portion has not yet been entirely gasified and contains tar. A valuable gas, rich in illuminating power, is thus produced. Although

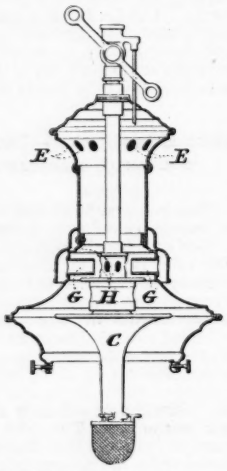


the production of gas in the second stage is, in a given time, much more abundant than in the first stage, yet the gas produced in the second stage is more suitable for illuminating purposes than is the gas obtained in the second stage of the ordinary dry distillation process; and, moreover, the heat stored up in the incandescent charge of the retort is better utilized in the production of gas by means of steam, so that after the retort is opened the coke withdrawn therefrom is much cooler than hitherto.

"If the process according to this invention be carried on in vertical retorts with lateral gas outlets, the outlets must be closed by suitable closing arrangements before the second stage is entered upon; and steam is introduced so that the steam is compelled to flow up through the whole length of the retort.

"Vertical retorts containing a sufficiently deep charge of fuel for steam to pass through in a vertical direction have been known since the early days of gas manufacture; but the essence of this invention does not consist merely in the use of such retorts, but in the described two-stage gasifying operation in such vertical retorts."

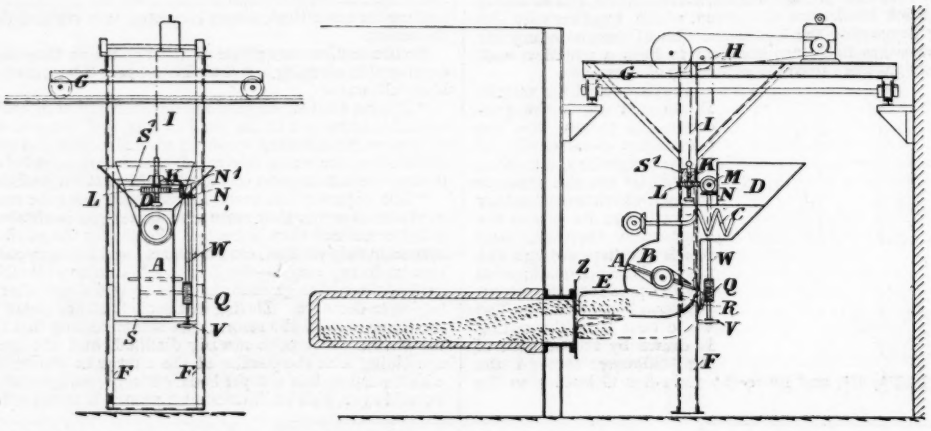
Inverted Gas-Lamp.—Zechnall, L., of Bunhill Row, E.C. No. 25,524; Nov. 23, 1903.



As shown, this lantern for an inverted incandescent light consists of a central gas-pipe, to the end of which the mixing-chamber D of the inverted bunsen burner is screwed so as to be readily detached. The lantern has at its upper part perforations E to let the hot air out. At the side or at the lower part, a number of tubes or pipes G pass across the space surrounding the burner, and terminate just in front of the air holes H in the mixing-chamber of the burner, so as to permit of the cold outside air passing through the tubes to the air holes, but at the same time allowing of the burner being removed from the lantern when required.

Retort-Charging Apparatus.—Bollé, C.; a communication from C. Eitle, of Stuttgart, Würtemberg. No. 23,008; Oct. 24, 1903.

This apparatus consists (as shown) of a casing A, with revolving fan blades or scoops B for projecting the coal, and a worm or equivalent conveyor for feeding the coal to the fan from the hopper D and deflector plate E. These parts are fixed together to a rectangular frame S, which is vertically guided by rollers in an upright frame F suspended from, or attached to, a travelling crane G, and is suspended by a chain I from a winch H on the travelling crane, whereby the apparatus can be raised and lowered to the level of the different retorts.



The apparatus works in the following manner: The vanes B of the fan A are rapidly rotated, and at the same time the worm C is turned. Coal is then delivered in regular and predetermined quantities from the hopper to the vanes of the fan, and projected by them through the outlet of the casing. The latter is turned towards the retort to be charged, and raised at the start to the position at which the longest distance of throw is obtained, so that the charging of the retorts takes place at its farthest end. By gradually lowering the apparatus (simultaneously with the lowering of the deflector), the length of throw is decreased correspondingly with the progressive charging of the retort and the *vis viva* imparted to the coal by the revolving vanes diminished, until the retort has been filled over its entire length. By lowering the apparatus and deflector at a quicker or slower rate, the charging can be effected, it is said, with any desired quantity of coal.

In order to prevent cold air being carried into the retort along with the projected coal, the outlet orifice of the apparatus is surrounded by a cover plate Z, of such shape and dimensions that the retort mouth is closed by it as airtight as possible at any height the apparatus occupies relatively to the retort mouth. The plate may be arranged to slide on the outlet pipe of the fan case, or be otherwise moveable in order to allow the apparatus to travel in front of the closed retorts by sliding back the plate or otherwise moving it out of the way, but to bring the plate close against the retort mouth while the charging takes place.

The essential characteristic of the invention is said to be the combination of a coal projecting apparatus, composed in a known manner, of a hopper, a feed worm or its equivalent, a fan, and a deflector, with mechanism for simultaneously lowering the apparatus and the deflector in order to obtain with a uniform velocity of the fan vanes any desired distance of throw and velocity of projection and any desired depth of layer charged in the retort, and, further, the arrangement of a cover plate on the outlet pipe of the fan for preventing cold air from being carried into the retort and explosions being produced.

The apparatus is represented in the position it occupies when the charging commences in full lines, while the dotted lines indicate its position when the charging is completed.

Proportional Meters.—Chrisman, H., of Wilkinsburg, Pa., U.S.A. No. 3541; Feb. 12, 1904. Date claimed under International Convention, Feb. 20, 1903.

Two forms of proportional meter constructed according to this invention are shown in the engraving on the opposite page.

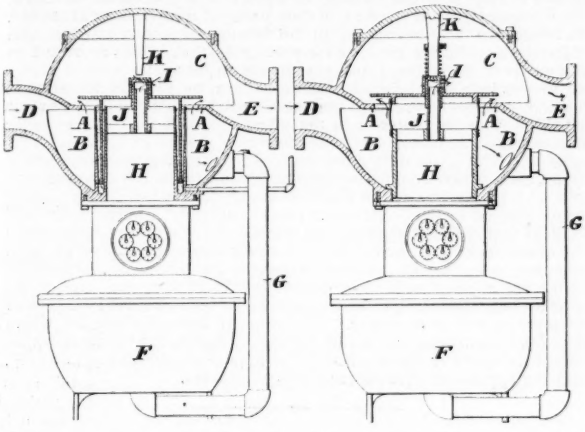
The casing is divided by a transverse partition A (in which is a central opening) into an inlet chamber B and an outlet chamber C. A lateral inlet D, for connection to a main, is formed upon the inlet chamber, and a similar outlet passage E is formed upon the outlet chamber. The outlet chamber is provided with a removable cap. The inlet chamber B is connected to a tally meter F—of any suitable construction, and of proper capacity to measure a determined fractional volume of fluid passing into the inlet chamber, with which the tally meter is connected by a pipe G. The delivery passage of the tally meter opens into a meter delivery chamber H, formed by a cylindrical wall projecting upwards into the inlet chamber.

Communication between the inlet and outlet is regulated by a combined valve and motor structure provided for the performance of the several functions of (*a*) a valve for controlling the flow of unmeasured fluid directly from the inlet to the outlet chamber, (*b*) a valve for controlling the flow of measured fluid from the tally meter to the outlet chamber, (*c*) a pressure plate actuated to impart an opening movement to the valves by the combined pressures of the unmeasured and measured volumes of fluid, and (*d*) a gravitating member for imparting closing movement to the valves.

The components of the structure referred to are a plate, which extends across the top of the meter delivery chamber and the central opening in the partition A, and a cylinder which extends upwards from the central portion of the plate and is closed at its top and has a lateral port I formed in its shell. The outer portion of the plate forms a direct delivery valve controlling the flow of unmeasured fluid from the inlet to the outlet chamber of the meter, and a pressure plate which is acted upon upwardly, or in a direction to impart opening movement to the valve, by the unmeasured fluid. The inner portion of the plate, which is of greater area than the outer part, forms a permanent partition between the meter delivery chamber H and the outlet chamber C and a pressure plate which is acted upon, in the same direction as the outer portion, by the fluid being measured. Within the central cylinder there is secured a sleeve or bushing, which traverses vertically upon a delivery pipe J leading out of the meter delivery chamber, and is provided with a lateral port which coincides with the port of the cylinder. The pipe J is open at its ends, and is supported by a bracket fixed to the shell of the meter delivery chamber. This combined valve and motor structure is preferably formed of sheet metal, with its constituents rigidly secured one to the other, so as to form an integral structure; its aggregate weight being such as to enable it to act as a gravitating member, in the opposite direction to the pressures of fluid which act in an upward direction upon it. A supplemental weight may be added to it, if found desirable; or, equivalently, its tendency to downward movement may be increased by the application of a spring as shown in the second arrangement of meter.

In the operation of the meter, the entire volume of fluid which passes through the supply conduit or main enters the inlet chamber B through the inlet passage D, and a determined portion of the fluid passes into the tally meter F through the supply pipe G, and, after being measured and its volume recorded by the tally meter, passes out into the meter delivery chamber H, in which its delivery pressure, as reduced by the friction of the tally meter, is exerted upon the inner portion of the pressure plate, and its central cylinder in opposition to the gravity of the combined valve and motor structure and the connected shell. The pressure of the measured fluid on the inner portion of the pressure plate, acting in conjunction with that of the unmeasured fluid on the outer pressure plate section, overcomes the opposing gravity and raises

the combined valve and motor structure, thereby opening communication between the meter delivery chamber and the outlet chamber, for the measured fluid, through the ports in the valve cylinder and its bushing, and between the inlet chamber and the outlet chamber, for the



unmeasured fluid, through the opening in the partition A controlled by the outer portion of the plate. The upward traverse of the combined valve and motor structure is limited by the stop K, with which the top of the valve cylinder comes in contact at the limit of its upward movement.

APPLICATIONS FOR LETTERS PATENT.

11,214.—Allinson, T., "Pipe-joints." May 16.
11,266.—Reitich, V. A., "Incandescent burners." May 16.
11,268.—Schweich, E., "Gas-producers." May 16.
11,337.—The Tubular Bath Boiler Company, Ltd., and Bushell, W. H., "Gas-range." May 17.
11,345.—Peasgood, J. F., "Acetylene generators." May 17.
11,349.—Morgan, G. T., "Manufacture of certain organic compounds of thorium." May 17.
11,380.—Liversedge, A. J., "Street-lamps." May 17.
11,388.—Bellamy, A. R., "Gas-motors." May 18.
11,410.—Main, R. B. & A. P., "Gas boiling and grilling attachments for kitchen ranges." May 18.
11,438.—Platts, H., and Clarke, H. P., "Inverted incandescent gas-burners." May 18.
11,442.—Kent, W. G., "Water-meters." May 18.
11,472.—Shaw, J. E., and Hipwell, D. E., "Utilizing the motory energy of expanding gases." May 18.
11,489.—Beresford-Wood, W., Gurney, H., and Burgess, J. F., "Gas-fittings." May 19.
11,537.—W. A. S. Benson and Co., Ltd., and Andrews, F. A., "Gas-lamps." May 19.
11,576.—Claughtons (Leeds), Ltd., and Austin, E., "Pressure reducer." May 20.
11,582.—Will, E., "Temporary gas lighting." May 20.
11,596.—Gillie, W. S., and Weïr, F., "Carburetting air." May 20.
11,621.—Pethybridge, G. H., "Burner." May 20.
11,649-50.—Winkler, H., "Gas-lamps." May 20.
11,667.—Robert, P., "Gas lighting and extinguishing." May 20.
11,711.—Morrell, R. L., "Gas-lamps." May 21.
11,719.—Hills, H. G., and Schill, C. H., "Gas-producers." May 21.
11,739.—Taylor, D. & W. M., "Gas-igniter." May 21.
11,751.—Silbermann, A., "Inverted incandescent burners." May 21.

Cape Town Water Supply.—A Bill is to be introduced into the Cape Parliament to obtain authority for the development of the water supply of Cape Town. The scheme set forth in the Bill entails an initial expenditure of about £2,000,000. It is proposed to obtain the increased supply from the surplus flood water of the Wolvenhoek River and tributary streams in Berg Rivers Hoek, near French Hoek Valley, in the division of the Paarl.

Londonderry and Water Gas.—The Public Health Committee of the Londonderry Corporation are agitated because the Gas Company are supplying the consumers with a mixture of water gas and coal gas; and at the suggestion of Dr. Ferguson, the Medical Superintendent of Health, they have decided to ascertain the nature and probable cost of apparatus for discovering the percentage of water gas present. The Chairman (Mr. W. O'Doherty, M.P.) said that Dr. Ferguson and other Medical Officers of Health were of opinion that a lot of sore throats, anæmia, and other diseases had been caused by gas companies using more than the proper proportion of water gas, and in consequence of faulty pipes in houses. They believed a lot of diphtheria was caused by water gas; and they were not going to allow the gas shareholders and Directors to reap larger profits than at present at the expense of the health of the citizens. Mr. M'Farland said that in Dublin and Belfast he was told they were using from 50 to 60 per cent. of water gas in conjunction with coal gas; while in Londonderry the percentage was only 5. The Chairman retorted that they had no proof of this statement; and he added that Professor M'Weeney, at a meeting of the Dublin Academy, had distinctly stated that he had traced nine deaths in Dublin directly to the introduction of water gas into coal gas.

PARLIAMENTARY INTELLIGENCE.

COURT OF REFEREES.—Tuesday, May 17.

SWINDON CORPORATION BILL.

This Bill came before the Court to-day—Mr. Parker Smith presiding; the matter under consideration being an objection by the promoters to a petition which the Swindon United Gas Company sought to present in opposition to the Bill.

Mr. Shiress Will, K.C., who appeared in support of the *locus standi* of the Gas Company, explained that formerly there were two places—New Swindon and Old Swindon—but that, under the Municipal Corporations Act, they had been amalgamated. New Swindon had obtained a Provisional Order enabling them to supply electricity; but Old Swindon had no such Order. When the amalgamation took place, however, the powers of the New Swindon Order were made to apply to Old Swindon. Under clause 23, the New Swindon Order was to be read, and have effect as if the borough, as now constituted, and five other parishes had been included in the schedule. Thus the Corporation were going into new parishes which formed no part of the existing Municipality of Swindon; and as these parishes were already being supplied by the Company, the competition would be fresh and new, and not an extension of existing competition. Therefore, their *locus* in this respect was absolutely clear. With regard to the next point, although the New Swindon Order, under the Order in Council which sanctioned the amalgamation, was made to apply to the area of Old Swindon, there was no recital of this fact in the Bill. Thus the Corporation did not rely upon their Order in Council, but wanted a fresh enactment enabling them to extend their powers of supply to Old Swindon. This being so, the Company were entitled to be heard against the proposal, as well as the one with regard to the outside parishes.

Mr. Brynmor Jones: Are you asking for a general *locus?*

Mr. Shiress Will: Yes; on the ground of competition.

Sir Chandos Leigh: Do your Company supply Old Swindon and New Swindon?

Mr. Shiress Will: Yes; and three outside places. A third point raised the question whether a clause enabling the Corporation to supply fittings in the outside areas gave a *locus*.

The Chairman: If we gave you the *locus* you asked for first, would that not cover this?

Mr. Shiress Will: Yes.

The Chairman: Then I think we had better take that first.

Mr. G. Fitzgerald, on behalf of the Corporation of Swindon, submitted that no case for a *locus* had been made out by the Company. For years the Provisional Order had applied throughout the whole of the existing borough of Swindon—the area of both New Swindon and Old Swindon—and therefore Parliament had already decided the question of competition as regarded the existing borough. Thus the Company were complaining of recent past legislation, which was no ground for allowing a *locus*. Then, as he understood, Mr. Shiress Will argued that, because the Bill did not in terms recite that the Order of 1899 united the districts, the Corporation were not relying on the Order.

Mr. Shiress Will: Because in this Bill you do not refer to the powers of any Order in Council, but seek legislation to supersede that Order.

Mr. Fitzgerald submitted that, as a matter of drafting, it was quite right to take the borough as it was to-day, and not to go into past history as to how it came to be a borough.

The Chairman: The Bill does not give you fresh powers?

Mr. Fitzgerald: It does not enact, or profess to give us, one iota of power in regard to the borough which we do not at present possess. Continuing, Counsel said the object of clause 23 was to extend the district of supply, not to five but to three parishes. This extension, he admitted, stood in a different position from the existing borough; but it could not be shown that the alleged competition there would injure the petitioners.

Sir Chandos Leigh: There is a largish area which has been lighted by the Gas Company, and you propose to take electricity into it?

Mr. Fitzgerald: Yes; and that leads up to the point that the competition, if any, is so slight that the Court, I submit, will not take notice of it.

Sir Chandos Leigh: As a matter of fact, do the Company actually light these parishes now?

Mr. Shiress Will: Yes; so I am instructed.

Mr. Fitzgerald, in concluding his reply, alleged that Parliament had already sanctioned the principle of competition as regarded the existing borough, which was by far the largest part of the area referred to by the Bill. To permit the extension proposed would be such a small increase of the existing competition that the Court should not allow the *locus* in respect of it.

Mr. *F. E. Cooper*, in reply to the Court, said he had asked the Solicitor to the Company on a former occasion if they were actually supplying in the three outer villages; and the reply was "Yes."

Mr. *W. S. Jones* stated, in reply to the Committee, that gas was actually being supplied in some of the houses in the three villages, and, in the one nearest Swindon, there were public lamps supplied by the Company.

Mr. Fitzgerald submitted that in any event the *locus* should be limited to the proposed extension to the three parishes.

Mr. Greene: If there is a competition *locus*, they can go into your finance and everything else.

The Chairman: Are you satisfied with a competitive *locus* as regards the extension of district, or do you want to go also into the question of finance all through the Bill?

Mr. Shiress Will: I want a general *locus;* and if your present decision is in favour of limiting me, I hope you will hear me on the broader point.

The CHAIRMAN: Of course, it is only Part III. that you are concerned with at all.

Mr. SHIRESS WILL: Yes; only the electricity portion.

The CHAIRMAN (after consultation with the other members of the Court): We give a *locus* under Standing Order 129, on the ground of competition. This, of course, entitles you to raise your points.

Sir CHANDOS LEIGH: You clearly understand you will be limited to Part III. You are not to go into the sanitary or other clauses.

Mr. SHIRESS WILL: Yes.

LEGAL INTELLIGENCE.

A WHARFAGE RATES QUESTION AT THE ANTIPODES.

A short time ago, the Judicial Committee of the Privy Council, composed of Lord Macnaghten, Lord Davey, Lord Lindley, and Sir Arthur Wilson, had before them an appeal, on behalf of the Australian Gaslight and Coke Company, against a decree of the Supreme Court of New South Wales in regard to the wharfage rates to be paid by the Company. The appellants' case was conducted by Mr. Haldane, K.C., and Mr. Bryan Farrer; the respondents being represented by Mr. Asquith, K.C., and Mr. Vaughan Hawkins. At the close of the arguments, judgment was reserved; and it was given a few days since by Sir Arthur Wilson. The nature of the dispute will be understood from the following extracts from the judgment.

The appellants held from the Crown leases of certain wharves adjoining their lands in Kent Street, Sydney, expiring on Dec. 31, 1899, and a like lease of another wharf adjoining their land at Mortlake, expiring on Dec. 31, 1900. On Nov. 28, 1899, while the Kent Street leases were still in force, the Company applied for a renewal of them; and on Jan. 31, 1900, for a renewal of the Mortlake lease. Nothing was shown to have been done at the time upon either of those applications; but the Company continued in occupation of the wharves. On Jan. 21, 1901, the Under Secretary for Lands wrote to the Company regarding the Kent Street premises, referring to their occupation "of the sites of terminated special leases," and requesting them to pay into the Treasury Department a sum of money "being rent at the former rates for the years 1900 and 1901." Payment was made as requested, and a receipt was given headed "Suspense Account," describing the money as rent on the expired leases, and adding the words, "Awaiting reference to Lands Department. Leases expired." A like payment was made on Dec. 31, 1900, in respect of the Mortlake wharf, and a similar receipt given. On May 14, 1901, the Company's application for renewed leases of the Kent Street premises was refused by the Government on the ground that the power to grant such leases had become vested in the Harbour Trust Commissioners under the Sydney Harbour Trust Act, 1900. This Act, which was relied upon by the Government as having altered the legal position, was passed on Feb. 11, 1901, and was declared to come into force on Nov. 1, 1900. Section 27 vested in the Harbour Commissioners all Crown lands within the boundaries of the port, subject to the interest of any persons in such lands existing at the time of the passing of the Act. Section 29 enacted that "no lease or licence in force at the commencement of this Act of, or relating to, any Crown land hereby vested in the Commissioners shall be in any manner affected by this Act;" while section 68 directed the Commissioners to collect in respect of all vessels berthed at any wharf vested in the Commissioners, or in respect of all goods shipped on, or unshipped from, any vessel so berthed, wharfage and tonnage rates according to the provisions contained in the Wharfage and Tonnage Act of 1880 and Acts amending it, which Acts were incorporated. On May 29, 1901, the Commissioners claimed payment by the Company of wharfage rates on coals unshipped at the Kent Street and Mortlake wharves since Feb. 11, 1901—the date of the passing of the Harbour Trust Act; and the correspondence which followed did not lead to an agreement. On the 27th of August, the Commissioners gave notice that, unless the Company paid the wharfages already due, and agreed to pay them in the future, vessels would not be allowed to berth at the wharves after the 1st of September. In pursuance of this notice, berths were refused to certain vessels. The present suit was brought on Sept. 6, 1901, by the Company and by one Gainford (who was interested in the matter by reason of his being under contract to supply coal to the Company) against the Commissioners, claiming an injunction, a declaration against their right to wharfage, and damages. A temporary injunction was granted *ex parte*. This was followed by a motion to continue the injunction, on the hearing of which the case was fully gone into, and Mr. Justice Walker made an order continuing the injunction; thus disposing of the whole suit on the merits. The full Court, on appeal, unanimously reversed this decision, and dissolved the injunction; and to reverse this the present appeal was made.

The question for decision was whether, as the full Court held, the Commissioners had the right to levy wharfage dues upon goods landed at these wharves; for if they had, everything else followed, and the appeal failed. In the arguments before their Lordships, the case for the appellants was placed upon two grounds. It was contended, first, that the Commissioners had power to levy wharfage rates only in the cases of public wharves and private sufferance wharves; and that, as the wharves in question were mere private wharves not falling within either of those descriptions, section 68 of the Harbour Trust Act did not authorize the levy of wharfage upon them. It was argued that, as the wharfage rates granted by this section were to be levied according to the provision of the Wharfage and Tonnage Act, and as that Act granted wharfage only upon two classes of wharves, the latter Act must be similarly restricted. In support of this contention, it was pointed out that in section 32, and perhaps in other places of the later Act, the distinction between private wharves and others was recognized as still subsisting and as material for some purposes at least. Their Lordships agreed with the full Court in thinking that the language of section 68 of the Harbour Trust Act was too clear to admit of such an interpretation. The wharfage rates granted by it were to be levied according to the provisions of the earlier Act; but they were granted in express terms upon any wharf vested in the Commissioners. It was contended, secondly, that by reason of the payment and receipt of rent in respect of the wharves for 1901, in the circumstances stated, the Company had, at the date of the passing of the Harbour Trust Act, an interest in the wharves within the meaning of section 27; that this interest was valid for 1901, or for part of it; that it was protected by the words of the section; and that it was an interest of such a nature as to preclude the levy of wharfage rates by the Commissioners. Their Lordships agreed with the full Court that this position was not tenable. The only interest in the wharves which the Company ever contemplated acquiring was connected with the leases for which they applied. The leases were never granted; there never was any right to claim them which could have been enforced against the Government; and with the passing of the Harbour Trust Act the possibility of their being granted by the Government came to an end. Supposing it could be held that the Company had an interest in the wharves, what would the character of that interest be? It could only be some kind of right, complete or incomplete, in the Company to the possession, occupation, or use and enjoyment of the premises as private wharves. And it had already been shown that wharfage rates were to be levied on private wharves as well as on others. The supposed interest, therefore, which had been contended for would have been ineffectual for securing the object for which it was invoked. The appeal was therefore dismissed; and the appellants were ordered to pay the costs.

The Sale of Spurious Mantles.

At the Grimsby Police Court, a plumber named Cole was summoned recently by the Welsbach Incandescent Gaslight Company for a breach of the Merchandise Marks Act by selling certain other makers' mantles as "Sunlight" mantles. It was stated that some years ago the defendant was a customer of the Sunlight Company (now taken over by the Welsbach Company), but that ultimately they refused to supply him with any more mantles in consequence of a difference on the question of price. Defendant, however, was afterwards found selling spurious "Sunlight" mantles for 3d. each, whereas the genuine ones were sold at 4½d. each. For the defence, Mr. Bloomer contended that the mantles were very much alike, and it would require an expert to detect a spurious "Sunlight" mantle from a genuine one. The defendant had been in business in Grimsby for the past 25 years, and there was nothing whatever against him. He sold the mantles in perfect good faith, believing them to be genuine. Though he had not purchased them direct from the Welsbach Company, he had got them from a firm who were large customers of the Company. The Magistrates fined defendant 21s., including costs; and the mantles were confiscated.

Vagaries of the Electric Light at Newport (Mon.).—The electric light has been up to its old tricks at Newport (Mon.). At a recent meeting of the Technical Instruction Committee, Mr. J. H. Williams directed attention to some failures of the electric light at the School of Art. The first time, the lights went out absolutely, and on another occasion the 8-candle power light was extinguished. Once there was a delay of about fifteen minutes. The Registrar (Mr. G. W. Moores) said that at the School Board offices special arrangements were made to have gas-fittings available in case the electric light failed; and he believed that this plan was adopted at the Hospital. Mr. W. Evans stated that he had had a similar experience in two of his shops, in one of which an outbreak of fire occurred. After some further remarks, it was decided that a Corporation electrician should be asked to make an examination and report; and if there was anything serious, it was to be attended to at once.

Gas v. Electricity in the East End.—An abstract of the accounts and balance-sheet for the twelve months ending the 31st of March last of the electric light undertaking of the Stepney Borough Council has lately been submitted to the Council. A large surplus was shown; a considerable portion of it was due to the increase in the charge for public lighting from £2923 in 1902-3 to £4918. At the meeting of the Council on Wednesday, a statement was presented showing that up to the end of February last there had been expended in supplying and erecting arc lamps £12,923. Apart from the payment of interest and the instalments of the sinking fund, the cost for current and maintenance was more than three times what had been paid for gas. The Works Committee, reporting on this, contended that the cost per candle power for electricity was less than for gas; and they laid stress upon the fact "that the electric light is a more cleanly illuminant, consequently a much more healthy light than that of gas." The accounts gave rise to some discussion, as the result of which it was resolved to reduce the charges for electric light to an amount which it is estimated will decrease next year's surplus to half what it is now.

Gas Workers' Union.—The biennial conference of the National Union of Gas Workers and General Labourers of Great Britain and Ireland was held at Swansea on Monday and Tuesday last week, under the presidency of Mr. Pete Curran. The report stated that the contributions paid by members in the two years were £39,823; other receipts (£785) making a total of £40,608. The payments made to the various members out on dispute amounted to £25,936. If the Union were going to pay out money for disputes in the same way as it had done for the past two or more years, 2½d. per week would not meet the demands. Hundreds of pounds had been paid away, with the result that the men were beaten, and then they left the Union. The President expressed the hope that they would all be a little more careful in disputes in the future. They had dealt with 528 accidents and wages cases reported, and gained the sum of £11,600; making a grand total of £30,921. The dispute pay for the past two years represented upwards of 45 per cent. of the net income, which came to more than 7s. 7d. per member, or over 9s. 3d. per financial member for the two years—the largest amount the Union had ever paid out in dispute money.

MISCELLANEOUS NEWS.

DENBIGH WATER ARBITRATION.

Wednesday, May 18.

(*Before Sir* HUGH OWEN, *Umpire.*)

An arbitration inquiry, promoted by the Denbigh Corporation, was opened to-day at the Surveyors' Institution, having reference to the question as to whether the water supply of the Denbigh Water Company was sufficient in quantity and quality for the requirements of the town. Mr. BURSTALL was the Arbitrator for the Company, and Mr. M. TAYLOR for the Corporation.

Mr. CRIPPS, K.C., and Mr. CHESTER JONES appeared for the Company; and Mr. B. F. WILLIAMS, K.C., and Mr. R. V. BANKES represented the Corporation.

Mr. WILLIAMS, in opening, gave the history of the Company's Private Act, obtained in 1853, and referred to the subsequent construction of the pumping-station. A portion of the supply was obtained from the River Ystrad, over which the Company had no rights to enable them to prevent pollution. Counsel proceeded to deal with the quality of the Company's water, and also with the quantity they were able to supply, which, he said, was totally inadequate to the demand. The reservoir was 2 miles outside the town; and the water was supplied from 58 pumps. The water was conveyed along the ditches into a channel, and thence to the reservoir. Recently pipes had been laid; but the arrangements were not such as to prevent pollution. The area of supply was mostly grazing land, largely manured, with several farmhouses, some of them with middens. The river was at times quite dry. He did not suppose it would be contended by the other side that 25 gallons per head was an unreasonable quantity of water to require. In 1891, a Committee, reporting to the North Wales Asylum, entirely rejected the supply of the Company. The Corporation had for some time been endeavouring to improve the sanitary state of the town by the introduction of water closets; but they were hampered in their work by the absence of adequate supplies of water for their flushing. The population of Denbigh which had to be supplied by the Company was about 5000. The quantity of water required was 25 gallons per head per day; but the Company were totally unable to deal with anything like this quantity. The water ought to be very well filtered; but the means of filtration were totally inadequate. From samples which had been taken and tested, it could be seen that the results were just what might be expected from the nature of the sources. The Sanitary Authority, under pressure, had started a scheme of sewerage for the town; and in addition to the supply of water which was already required, and which they did not get, they needed a very large quantity for the flushing of the sewers. The supply was constantly being cut off. He would call evidence which would satisfy the Court that the supply of water was entirely inadequate, and that its quality was not such as was desirable.

Mr. *Bailey Denton*, examined by Mr. BANKES, said he had inspected the district in question with a view of advising the Town Council of Denbigh. The population was about 5000; and the proper daily allowance of water per head was at least 25 gallons per day. They required 125,000 gallons per day with the present population. From his observation, there was absolutely no possibility of supplying this quantity from the present sources. Considering the source from which the supply came, the water must be polluted. On the day of his inspection, there was very heavy manuring going on. The reservoir contained 4,954,000 gallons, which was equivalent to 39½ days' supply. This he considered insufficient. There ought to be at least 100 days' supply. The only other source was the well supply. The River Ystrad in the summer months was very nearly dry; and it was open to cattle, &c., going there in the hot weather. In regard to the filter-beds, they were three in number, within an area of 439 square yards, or thereabouts; and he considered that their capacity was insufficient. There should be five filter-beds. With regard to the reservoir, he believed it would hold 120,000 gallons, or nearly one day's supply for the population.

Mr. BANKES: Is one day's supply sufficient?

Witness: It might be in some circumstances; but in Denbigh it is not, because there is only one engine.

In further examination, witness was understood to say that, in the case of a big fire, there would be no water available.

Mr. *J. Davies*, the Borough Surveyor of Denbigh, and a number of other local witnesses also gave evidence with regard to the inadequacy of the sources of supply to the town, pointing out that the River Ystrad was frequently nearly empty during the summer months—in fact, it was possible to walk across it at any point. It was a river that flooded easily; and when in flood the water was in a very dirty condition. There was nothing done in any way to protect the stream from the cows or anything else going into it.

Mr. *E. J. Roberts*, the Head Master of a Board School at Denbigh having over 200 boys, said he had complained about the water supply. There was not always sufficient to flush the closets; and he had seen them without water for a fortnight at a stretch. He himself had sometimes been without water to wash in the morning. As recently as last Thursday he had no water in his house for several hours.

Mr. *R. W. Lloyd*, Captain of the Denbigh Fire Brigade, said that in his opinion there was not a proper supply of water in the town. There were about 40 hydrants in connection with the Company's mains; but there was not always pressure. There had been fires, and delays had taken place in getting on to their work. They had not found sufficient water when at practice sometimes.

Dr. *Thresh* gave the results of chemical and bacteriological examinations of the water supplies. In November, 1903, he received samples of water from Denbigh for analysis, in one of which he found an excessive number of organisms from manurial contamination. This was an inlet sample. The result of a chemical examination showed an excess of organic matter. Bacteriological examination at the outlet was decidedly better, and the number of organisms greatly reduced. The drinking water from the tap supply to the town was satisfactory.

Thursday, May 19.

Dr. *Thresh*, continuing his evidence to-day, stated that he found the water from the Tymawr reservoir inlet was turgid, and contained water worms. It contained an excessive number of organisms, and certain of them were characteristic of sewage contamination. The water from the outlet at the reservoir was similar, but contained no worms. The water from the river contained low forms of animal life derived from sewage. The river water was absolutely unfit for domestic use. In water taken from the tap, he could not find sewage and manurial organisms. Chemically it was satisfactory, but unsafe for domestic use. The arrangements for filtration by the Company were very primitive. It was simply thin straining. Witness put in analyses in support of his evidence.

Mr. BURSTAL: Would not the storage of the water in the reservoir for forty days have some effect?

Witness: It would; but not to the extent of eliminating risk.

Dr. *Dupré* said he received five samples of water in March last for analysis. The water taken from the river contained evidence of sewage pollution, and without very careful filtration it would not be desirable for the town supply. The water taken from the well was bacteriologically slightly better, but chemically identically the same. The reservoir water was very bad; but it was a little better than the river. The water taken from the feeder leading into the reservoir was also very bad, and undoubtedly polluted by sewage. He had inspected the gathering ground with Dr. Thresh, and found the collecting area quite unfit. He had also visited the filter works. He thought the filter beds were too small.

Replying to Mr. CRIPPS, witness admitted that a sample taken from the Bull Hotel at Denbigh, and chemically analyzed, showed a good water. He did not know what the rate of filtration was.

Mr. CRIPPS, in opening the case for the Company, said that what the Court had to determine, under section 52, was whether the Company were able and willing to supply water proper and sufficient for all reasonable purposes for which it was required by the Local Authority. The onus was upon the Local Authority to show that they had brought sufficient and satisfactory evidence to convince the Court that this particular Company were neither able nor willing to supply water proper and sufficient for all reasonable purposes required by the Local Authority. It was really a question of policy. Taking things exactly as they were and had been, they had water sufficient in quantity and of average quality. Taking matters before the new sewage scheme had been developed—a scheme evidently extremely necessary in regard to the sanitary condition of the town—it had been stated by Mr. Bailey Denton that 80,000 gallons a day would be about the proper quantity required by the population of Denbigh; but the Company did not limit themselves to 80,000 gallons, because they could supply a great deal more. They had an ample supply. There was a watershed which was capable of itself supplying about 112,000 gallons a day, even on the three dry years' system. They did not want this at all, because now they were supplying altogether, with the Railway Company, about 125,000 gallons a day, and had been supplying this quantity for some time. They did not want the whole of the supply which came off the Tymawr watershed; it would be quite sufficient for their purpose to use about 60,000 gallons. It might be satisfactory to the Local Authority of Denbigh to know that all the evidence which had been produced with regard to the water from the reservoir was favourable. So far as the reservoir was concerned, it gave a remarkably pure water, unless they condemned all water derived from the surface or rivers where there was an outside possibility of contamination. As regarded half, or more than half, of the supply, it was a moorland water, of an excellent character and exceedingly pure. As to the river water, this was less satisfactory as a source of supply, as might be expected, because the possibilities of contamination were probably greater. The attacks made upon the Company were monstrous. Every attack had been made upon them in order to depreciate the value of their undertaking. But after all the evidence that had been given, not one single illustration could be produced of any evil result in Denbigh operating from the water supply. It came to this, that two or three gentlemen had made complaints once a year about the water. Looking at the question in a sensible and reasonable light, there was no doubt whatever that, having regard to the conditions of a small water supply in a town like Denbigh, there had been no evidence whatever, either as to disease introduced or of complaint of general inefficiency as to the amount of the supply. With regard to the quality of the water, they had not to consider here any matter of theoretical impurity. The only question really involved was whether the water supply had been of fairly or sufficiently good quality in order to meet the conditions of the Public Health Act. There had been no evidence whatever given, from bacteriological analyses, as to results affecting the health of the Denbigh district. With regard to the filtration, the rate had not been calculated by any witness who had been called on behalf of the Corporation; but at the present time they were extending and improving their filter-beds. He contended that the Denbigh filtration was of a much higher standard than that in London. There had been nothing to show that the water was not up to the standard, except some theoretical notions. Attacks upon the Company should not be made in order to depreciate the value of their undertaking when the time came for it to be taken over. Their whole meaning was to attempt to depreciate the value of the water supply in order that the Corporation might purchase upon easier terms.

Mr. *G Strachan* stated that he had visited the water-works and gathering grounds. He formed an estimate that the number of consumers in Denbigh was about 5000. He found that in the month of January not only 80,000 gallons, but 95,000 gallons a day were supplied; 104,000 gallons in February; 98,000 gallons in March; and 94,000 gallons in April. The figure was high for February, owing to a fracture of the main. He found that 112,000 gallons was the least average yield for three dry years; and a much larger figure would be shown in ordinary years. He would not say that the water going into the well was unfit for use. So far as he knew, the water from the well and the bore hole was of

good quality. He thought that whatever pollutions were in the river were due to the inaction of the Denbigh Corporation.

In cross-examination by Mr. WILLIAMS, witness said he would not call the watershed from which the springs were supplied a contaminated source; but perhaps the quality of the water was open to some remark. He would advise an improvement of the filter-beds, as they were not in accordance with modern ideas; he would give them 120 square yards more. He had seen better and worse sand; but he considered it satisfactory.

Dr. *R. J. Hughes*, Hon. Physician to the Denbigh Infirmary, said he had never been able to trace a single case of sickness in Denbigh to the water supply. It was pure water to look at. He had not analyzed it.

A number of other witnesses were called in support of the Company's case; Mr. *A. Palmer* testifying that he considered, from a chemical analysis of the water, it was of good quality.

Mr. CRIPPS submitted that the question of the quantity had been disposed of by the evidence; and as to the quality, it was the duty of the sanitary authority to put an end to the so-called insanitary conditions of the River Ystrad within their own area, instead of attacking the Company upon the point.

Mr. WILLIAMS, summing up the case for the Corporation, contended that the complaints concerning both the quantity and quality of the water from time to time were overwhelming; and it had been conclusively proved that it was totally unfit to drink. He trusted that the Court, by their award, would enable the Corporation to go to Parliament to construct works for the purpose of affording the town an adequate supply of water.

At the conclusion of the proceedings, the Court reserved their award.

MONTE VIDEO GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Thursday, at Winchester House, Old Broad Street, E.C.—Mr. T. C. TATHAM in the chair.

The SECRETARY (Mr. Henry Kearns) having read the notice calling the meeting, the report and accounts were taken as read.

The CHAIRMAN, commenting at once on the accounts, said if the shareholders turned to the debit side of the balance-sheet, they would see that the issued share capital remained the same. Of the £80,000 of debenture stock which the shareholders authorized the Directors to issue two years ago, £30,240 had now been raised. This was a small increase of £500 on the total of last year. Of the £58,000 of debentures which they commenced to pay off in 1897, only £10,440 now remained; and this would be paid off in the course of the next two years. The reserve account, out of which the debentures had been paid off so far as they had gone, now stood at £34,200. The insurance fund was £12,500. The contingency account, after adding to it £3500 from profit and loss, stood at £12,355. He should like to see this account stand at a higher figure; but he thought it was a matter for satisfaction that in the troublous times in which they were living the Directors were enabled to add to it this year. Sundry creditors in Monte Video and London were £1362 less; last year they were about £1900 more. But, of course, such fluctuations occurred in the ordinary course of business. Turning to the credit side of the account, their capital expenditure stood, after writing off £3146 for depreciation, at £598,435. After adding expenditure on new and additional mains, services, and meters (which amounted to £1333), the capital stood on balance at about £1800 less than a year ago. Coming next to stocks, the coal was about £3000 less than in December 1902. The Company were quite well stocked; but the amounts varied from year to year according as the Directors took advantage of the low freights to get the coal out to Monte Video. Gas-fittings (which he liked to keep as low as possible) showed a decrease of about £700; and the total now was very different from what it was some years ago. As they decreased the stocks, so he hoped to be able to decrease the expenses of that department. The stocks of residual products were less by about £400. Materials for use on the works showed a reduction of about £500; while materials for sale showed an increase of about £200. Then the sundry debto s and outstanding accounts exhibited a decrease of nearly £1700. The Company's investments, taken at their selling value on Dec. 31, amounted to £25,638; while "other property" (which for the most part was let to the workmen, and gave a fair return on the outlay), they kept at the same value—viz., £8249. The Chairman also referred to other items; concluding his examination of the balance-sheet with the remark that he considered the accounts showed that the Company's financial position was a satisfactory one. Turning to the revenue account, he said that he thought on the whole the shareholders would be satisfied, especially when they remembered that absolutely all of the public lighting had been taken from the Company, and that they had to compete with the electric light, which was a Government concern. In the gas department, they had had an increase in gross of close upon £1500. The expenditure in Monte Video showed a decrease (which, of course, was on the right side) of £174 only. The result, however, was that they had an increased balance to carry to the profit and loss account. Turning to that account, it would be seen that, including the balance from last year, they had an available total of £37,377. From this they had deducted debenture charges and expenses, which altogether amounted to £2520. The Directors had also written off £826 bad and doubtful debts, and, as he had explained, £3146 from capital account, besides placing £3500 to contingency account. The dividend for the year would take £18,967; and they would increase the balance forward by £1248 Now, looking at these accounts, and bearing in mind the conditions under which they carried on this business, he thought they would have been entitled to hope that they had distinctly turned the corner. But these hopes had been rudely upset by the revolution in Uruguay; and they could not but see that it was telling, and would tell seriously against them this year. Business was interrupted, theatres were closed, and people were leaving the city. The Directors would endeavour, with due regard to efficiency, to curtail expenses wherever possible, and to keep in a position to avail themselves of better times when they came. It was disheartening to think how much this revolution would injure the country, which, under the capable Government of the past few years, showed every sign of material improvement. One could easily foresee, even if this revolution ended, a trying period of depression, and probably a large floating debt, which, as they knew from former experience, must weigh against the resources of the country. There was one satisfactory matter to mention, but it was a matter which had given a great deal of trouble and anxiety. In August, 1901, the Company were "denounced" (as it was called) for the non-payment of certain taxes, over a series of years, on the capital of the Company. It was contended by the Tax Office (the people who took action against the Company) that the taxes ought to have been paid on the whole of the Company's property, and not, as the Directors contended, on the undertaking and property of the Company which was represented in Uruguay. He did not pretend to give the shareholders the full details of this dispute; but it was a matter of considerable importance to the Company, for it represented a large sum. It was taken by the Finance Minister to the Court of First Instance; and this Court decided against the Company. The Directors discussed the matter very fully here with their legal adviser; and they held themselves a very strong opinion that the decision could not possibly be upheld. Therefore they appealed; and he was glad to be able to tell the shareholders that some few days ago they received a cablegram from their Manager to the effect that judgment had been given in their favour—that the previous sentence had been revoked, and the "denouncement" declared unfounded. The Directors understand from the cable that the judgment was final; which was very satisfactory. The Chairman then moved—"That the accounts now presented be received and adopted."

Mr. MARTIN TUPPER HOOD seconded the motion, which was unanimously carried.

Moved by the CHAIRMAN, and seconded by Mr. SIMPSON ROSTRON, a dividend of 8s. per share, less income-tax, was declared; making, with the interim dividend, 3½ per cent for the year.

The retiring Directors (Mr. T. C. Tatham and Mr. Robert Morton) and the Auditors (Messrs. Price, Waterhouse, and Co., and Mr. T. S. Soden, were re-elected.

The CHAIRMAN said he should like next to move a vote of thanks to the officers on the other side. There had been a great deal of difficulty which it was not worth while to talk about now, particularly in connection with the lawsuit. It had required a great deal of anxious care and thought; and he was glad indeed to be able to congratulate the Manager and all concerned on the result of that lawsuit. He also asked the shareholders to particularly include their excellent Secretary and those who supported him.

Mr. R. MORTON, in seconding, said, in addition to the difficulties on the other side referred to by the Chairman, there had been difficulties connected with the revolution which had directly interfered with their staff of workmen. Conscription had proceeded to some extent; but Mr. Lane was able to get the authorities to exempt the gas-workers for a time. But they had heard from their Manager that, when the tension grew greater between the two parties, the authorities had come and taken some of the men. Under these circumstances, he thought a vote of thanks to the staff out in Monte Video was well deserved this year.

The motion was heartily carried; and the SECRETARY, on behalf of the officers and their staffs, acknowledged it.

A cordial vote of thanks to the Chairman and Directors terminated the proceedings.

CAPE TOWN AND DISTRICT GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held at the London Offices, New Broad Street House, E.C., last Thursday—Mr. J. E. LILLEY, J.P., in the chair.

The SECRETARY (Mr. H. Yuill) having read the notice convening the meeting,

The CHAIRMAN, in moving the adoption of the report and accounts, first expressed regret at the unavoidable absence of Mr. Boustead, the Chairman of the Company, through indisposition, and then went on to say that, as shown by the report, the result of the year's working was a profit of £24,036, to which had to be added the balance of premium (£154) realized on the recent issue of debenture stock; and £1759 was brought forward. The profit was not so large as the Directors had to report last year; but, as was then explained, it was considered advisable to give the consumers the benefit of a reduction in price. This was a course which tended to benefit both the purchaser and the supplier. After providing for the debenture and debenture stock interest paid and accrued to the 31st of December last, and the dividend on the preference shares, there remained £15,074. Of this amount, £5000 had already been paid to the ordinary shareholders, being an interim dividend at the rate of 10 per cent. per annum for the half year ended June 30 last; and the Directors now recommended the payment of a final dividend on the ordinary shares at the same rate for the second half of the year, free of income tax. Further, they were placing £3000 to the reserve and contingency account, making it £19,000, and £2074 was carried forward. The business had increased very much during the year by the laying of mains in streets which had not hitherto been supplied. He had on previous occasions told the proprietors that there were certain municipalities surrounding Cape Town who, some years ago, would not allow the Company to put mains in their streets. But they had seen that the policy of the Company was to deal fairly with their customers, and to do their very best to make the commodity they supplied useful and convenient to everybody. He was therefore happy to say that all the important municipalities adjoining Cape Town were taking the Company's gas. They did not fear competition in any way with regard to electric lighting, for they were working amicably with

everyone. The increase in business was still going on; and, so far as could be judged, it would continue to do so for many years to come. The Directors had made satisfactory arrangements for the supply of coal during the current year, and everything appeared to be in excellent working order. One thing he ought to mention, and this was that recently there was an explosion in connection with one of the old gas-holders; but, fortunately, no one was hurt and very little damage was done. Even the Manager's house, which was near the works, was not injured. The explosion did not affect the position of the Company financially, for the holder was insured; nor would it interfere with the power of the Company to supply their customers. This was the first accident of the kind they had had; and the Directors had not been able to fix the blame upon anybody. They were paying the same dividend as before, and the accident did not affect their stability. They had expended £36,000 on capital account, and had received good value for their money. They had laid 13 miles of new mains, and had added 850 new consumers to the list. In conclusion, he assured the proprietors that the Company were in a thoroughly sound and satisfactory position.

Mr. H. R. SAVORY seconded the motion, and, after a short discussion, it was carried unanimously.

The retiring Director (Mr. J. Boustead) having been re-elected and the Auditors re-appointed, the proceedings terminated with a vote of thanks to the Chairman and Directors.

THE INQUEST ON MR. F. G. DEXTER.

As was briefly stated in last week's "JOURNAL," an inquest was held at Winchester on Saturday, the 21st inst., upon the body of Mr. Frederick George Dexter, the Manager of the Gas and Water Company in that city, who committed suicide by shooting himself while lying in bed at his residence the previous afternoon. Among those present were Mr. J. C. Warner and Mr. W. T. Warren (Chairman and Vice-Chairman respectively of the Company); and at the outset of the proceedings, the former gentleman said he wished to express publicly the very great sorrow that he and his colleagues felt at the sad event.

The first witness to give evidence was Mr. Thomas P. Dexter, a retired schoolmaster, of Portsmouth, who said that deceased, who was his son, was 40 years old last April. Witness had been living with him on and off during the last four weeks. Deceased had been very much out of health mentally and physically; and his mind appeared to be affected to some extent. They were almost on the point of taking steps to have him put under restraint. He had great trouble. On the previous day, about 4 p.m., witness heard a noise while they were coming downstairs. Deceased was upstairs on the bed; and witness was below with his wife and her sister. Mrs. Dexter went up, and witness followed directly after. He found deceased lying on his back in bed with his face bleeding. He did not see any revolver then; but deceased had been shot right through the temple. He thought he saw the revolver afterwards, lying on his bosom. The weapon, which had been in the house some time, had been brought over from South Africa by his brother-in-law, and had been among other curios about the house. Mrs. Dexter was under the impression that all weapons had been taken away; but this revolver had been secreted. The Coroner: I am glad you explained that. Witness (continuing) said deceased was quite dead when he got to him. In answer to Mr. Clark (who appeared for the relatives), witness said deceased's trouble was imaginary.

Evidence was also given by Dr. Spencer Browne, who stated that he was called in shortly after five o'clock on the previous afternoon. Mr. Dexter had then been dead about an hour. There was a bullet wound from right to left. It was fired at very close distance, and was self-inflicted.

The Coroner said there were two other witnesses—the sister-in-law and the servant. They could be called if the Jury wished it; but they would probably think they had heard quite sufficient of a very painful matter—as all these inquiries were—especially in the case of one whom they had known and highly respected as a citizen, and as a most useful citizen. Of course, the Jury had to be satisfied as to what happened, and as to the state of the deceased's mind at the time of the occurrence. He hoped he was not going too far when he said that, in such cases, the less they tried to ascribe the trouble for these occurrences the better. The greatest consideration and kindness they could show those left behind was to draw a veil over the sad event. So far as they were concerned, they would like to show their sympathy. This was a clear case of suicide, in which the mind was unhinged; and the Jury would have no difficulty in saying deceased committed suicide while of unsound mind. He rather agreed with the old French saying that "He who excuses, accuses;" but Mr. Warner, as Chairman of the Gas and Water Company, had informed him that, so far as the accounts of the Company were concerned, they were absolutely correct. It was very kind of Mr. Warner to state this; and he (the Coroner) hoped that it would be emphasized.

The Foreman said the Jury were agreed that the deceased committed suicide while of unsound mind; and they also wished him to express, on their behalf, the great sorrow they felt, and their sympathy towards the relatives of the deceased, in the sad occurrence that brought them there that day, in the case of a gentleman whom they had known so long and respected.

A verdict of "Suicide while of unsound mind" was then recorded.

A Gratifying Surplus at Leeds.—From a statement of the City Accountant (Mr. Derry), which has been placed before the Leeds Gas Committee, it appears that the actual surplus on the working of the gas undertaking for the year ending March 25 amounts to £28,559. The gross profits were £108,924, from which had to be deducted £2970 for income-tax, and £49,347 for interest, &c., leaving a net profit of £56,607. Against this had to be placed redemption fund charges, amounting to £28,048. Last year the surplus was £11,018 only.

BOLTON CORPORATION GAS SUPPLY.

The Past Year's Working.

The report of the Gas and Lighting Committee of the Bolton Corporation for the year ending March 31 has just been issued. It is accompanied by the accounts, which show that the revenue from the sale of 964,463,000 cubic feet of gas for public and private lighting (less discounts) was £125,478, that residuals produced £46,078, and that the total receipts were £173,499, against £166,434 the preceding year. The expenditure on the manufacture of gas was £80,132; on distribution, £8428; on management, £2232; and other expenses made up a total of £98,705, compared with £104,662 before. The balance carried to the profit and loss account is £74,794, against £61,772. After providing for annuities, interest on loans, and the sinking fund, and appropriating a sum of £20,000 in aid of the rates, the remainder, amounting to £27,786, has been placed to the reserve fund account. The total net capital expenditure on the undertaking amounted on the 31st of March to £658,132; or at the rate of £646 4s. 10d. per million cubic feet of gas made, £6 13s. 9d. per ton of coal carbonized, and 13s. 7d. per 1000 cubic feet of gas sold. Since the works were transferred to the Corporation in 1873, a total gross profit of £1,458,410 has been made, £377,693 has been paid in annuities, £125,745 for interest, £150,796 for dividend, £59,359 to the sinking fund, £312,806 carried to the reserve fund for renewals, &c., and £432,008 applied in aid of the local rates.

The report furnishes the following comparative statistics relating to working in the past and the preceding year:—

	Year 1904.		Year 1903.
Tons of coal and cannel carbonized	98,398	..	99,606
Average cost per ton delivered on the works and trimmed	10s. 7¼d.	..	11s. 7¾d.
Percentage of cannel used	1·51	..	2·05
Gas made, cubic feet	1,018,423,000	..	1,019,993,000
Gas made, cubic feet per ton carbonized	10,350	..	10,240
Gas accounted for, per ton carbonized	9,896	..	9,741
Gas unaccounted for, per cent.	4·38	..	4·87
Maximum quantity of gas supplied in 24 hours, cubic feet	5,813,000	..	5,829,000
Minimum quantity supplied	858,000	..	868,000

The scheme of gasholder reconstruction at the Spa Fields station has been completed by the conversion of another two-lift holder into one of three lifts; making three gasholders constructed during the past three years, and increasing the total storage capacity from 6½ million to 7¾ million cubic feet. The incandescent system of lighting the public lamps, having been at work for several years in the leading streets of the borough with most satisfactory results, is now being gradually extended to the secondary thoroughfares. The number of lamps on the 31st of March was 5168. Adding 752, the number in the Turton and Horwich districts, makes a total of 5920 lamps supplied with gas by the Department at the close of the year covered by the report.

WEST BROMWICH CORPORATION GAS SUPPLY.

A Successful Year's Working.

The annual report on the working of the gas undertaking of the West Bromwich Corporation, which has just been issued by the Secretary (Mr. T. Hudson), shows that the year ending the 31st of March was a very successful one. No money was raised, and no additions were made to the capital account. The loan indebtedness was reduced by £2753 taken from the sinking fund; leaving the total of that fund £26,444. The net debt at the end of the year, after deducting this amount, was £151,243. The revenue account showed the total sales of gas, including that used for public lighting, exceeded the previous year by 2·14 per cent.; but there was a slight decrease in the quantity taken by prepayment consumers. The total consumption was 328,032,182 cubic feet, against 321,141,665 cubic feet in the previous year—an increase of 6,890,517 cubic feet; and the loss of gas through leakage and condensation was 12,870,818 cubic feet, representing 3·73 per cent. of the total bulk made. The income from gas sold, notwithstanding the reduced prices charged for that used for motive power and manufacturing purposes, showed an increase of £550 13s.—a result by no means unsatisfactory having regard to the general state of trade in the borough. The number of houses was 14,016, of which 4848 were supplied with gas through the ordinary meters, and 5528 by means of prepayment meters—making together 10,376. The total number of consumers of all kinds at the end of the financial year was 10,685—an increase of 182. The aggregate income from residual products was £1378 more than in the previous year; and that from gas fittings and stoves £324 more. The total income from all sources was £59,273, against £57,020; being an increase of £2252. The total expenditure on the trading account was £45,029, against £43,997—an increase of £1032. The manufacturing charges amounted to £32,793, or an increase of £1063. The coal carbonized was 28,307 tons, yielding 314,028,000 cubic feet of gas, or an average of 11,093 cubic feet per ton; while the quantity of coke used in the manufacture of water gas was 526 tons, yielding 31,692,000 cubic feet of gas, or an average of 60,251 cubic feet per ton—both being slight increases compared with the previous year. The total quantity of gas made, therefore, was 345,720,000 cubic feet, or 8,329,000 cubic feet more than in 1902-3. The total length of mains on March 31 was 45 miles 1340 yards; and the total number of consumers per mile of main was 233; the quantity of gas sold (including public lighting) being 7,170,000 cubic feet. The gross profit on the trading account was the highest in the history of the undertaking, and amounted to £14,244, against £13,023 in 1902-3—being an increase of £1220, and representing 8·02 per cent. on the

outstanding capital debt. The balance standing to the credit of the profit and loss account at the commencement of the year was £15,186, of which £4057 (being the previous year's net surplus) was transferred to the depreciation and suspense fund account. The surplus remaining, after providing for all charges and liabilities, amounted to £5647—an increase of £1590. The depreciation and suspense fund account commenced the year with a debit balance of £21,826, which was increased during the twelve months by £216, the outlay on prepayment meters and fittings. The account had been credited with the sum of £4057, the net surplus of the previous year; thus reducing the debit balance to £17,985. The total outlay in connection with the installation of prepayment meters to the end of the year amounted to £22,192.

LEIGH (LANCS.) GAS AND WATER SUPPLY.

Annual Report and Accounts.

The Engineer and Manager of the Leigh (Lancs.) Gas and Water Works—Mr. James Gibson—has recently presented to the Gas and Water Committee his reports on the working of the two undertakings in the year ending the 31st of March. He begins by stating that the whole of the works were kept in a high state of efficiency; the only addition to the plant being a benzol carburettor. The cost of maintenance and general repairs was considerably reduced; a total saving of £1045 having been effected, or £495 more than was estimated. Of this reduction, upwards of £100 was upon the water account. The total length of mains laid is 45 miles 1459 yards. There was an increase of 524 consumers—55 ordinary and 469 on the prepayment system—and of 80 gas-stoves. There was less raw material carbonized by 52 tons than in the year 1902-3; but 2,267,000 cubic feet more gas was sent out; the total quantity sold being more by 4,327,400 cubic feet, or 3·05 per cent. Though the increase in the consumption was fairly satisfactory, considering the state of trade in Leigh during the year, Mr. Gibson says it was much below what was anticipated as the result of the reduction in price which took place last May. The make of gas per ton of coal and cannel carbonized was 11,006 cubic feet, and the quantity sold 10,623 cubic feet; being higher than in any of the past eleven years. The average cost of coal, cannel, and benzol, including carting, was 11s. 9·63d. per ton, or 1s. 11·364d. less than in 1902-3, due mainly to the substitution of benzol for cannel for enrichment purposes. The revenue from the sale of gas for the current year will be reduced by £209 by the lowering of the price. Mr. Gibson draws the Committee's attention to the effect of supplying gas to the public lamps at the net cost of production. He points out that the low net cost for the current year will cause a further decrease of 6d. per 1000 cubic feet in the revenue; and he assures the Committee that, if this system is not altered, it will not be very encouraging to produce gas cheaply, resulting as it has done in penalizing the Gas Department last year to the extent of £702, and will do so this year to the amount of £1053, at the present rate of consumption. He suggests that it would be better to charge for the street lighting at the price paid by the large consumers—viz., 2s. 8d. per 1000 cubic feet—and at the end of the financial year return from the profits any deficit on the public lighting rate. Mr. Gibson contends that, by the present system, the Gas Department has given £700 towards the public lighting rate by supplying gas for street lighting at the net cost of production. The position of affairs is as follows: Less revenue from gas—ordinary consumers, £209; public lamps, £351; increased rates and taxes, £240—total decrease, £800.

In considering the balance-sheet, Mr. Gibson reminds the Committee of the adverse balance of previous years, now amounting to £6478, which he presumes will require to be paid out of the profits of the gas undertaking; and he points out that extensions to the carbonizing plant and gasholders, or an installation of carburetted water-gas plant, will be necessary within the next few years if the consumption of gas should continue to increase as at present, as during the past winter the whole of the retorts were in use. Keeping gas at the present price, and utilizing the profits for the purpose of effacing the adverse balances and as far as possible for carrying out the above-named extensions, is, in his opinion, the only method of reducing the capital charges which are responsible for the high price of gas in Leigh, and with which the gas undertaking is now so heavily burdened. He ventures to state that there is no town in England selling gas so cheaply, having a capital charge of 1s. 4d. to pay on every 1000 cubic feet of gas sold. During the past eleven years, the gross profits have gone up from £3309 to £12,648; being 3·63 and 7·78 per cent. respectively on the capital employed. The capital charges per 1000 cubic feet of gas sold were 9·95d. in 1899. They have steadily risen till they are now as mentioned above, 1s. 4d., which is rather more than 1¼d. lower than they were for the year 1902-3.

With regard to the water undertaking, the profit last year amounted to £525, compared with £522 in 1902-3. The total quantity of water paid for to the Liverpool Corporation was 165,045,000 gallons; to the Bolton Corporation, 81,000 gallons—total, 165,126,000 gallons; but 1,111,000 gallons were lost. Of the remainder, 124,846,500 gallons were supplied on assessment and for cattle-watering purposes, at 9·59d. per 1000 gallons, producing £4988; and 39,168,500 gallons for trade and domestic purposes through meters, at 1s. 4·39d. per 1000 gallons, producing £2676—making together £7664, against £7402 for the year 1902-3. The capital invested in the undertaking is £47,485, including £4762 expended under the Leigh Corporation Act of last year. Taken on the population supplied—*i.e.*, 43,000—the consumption per head per day in the financial year was 10·42 gallons, or 7·9 gallons excluding the quantity used by meter for trade purposes. The maximum consumption in 24 hours was 565,000 gallons; the minimum, 350,000 gallons.

The Chemical Engineering Company and Wilton's Patent Furnace Company have received an order for one of their round open saturators from the Holywood County Down) Gas Company.

DEVONPORT CORPORATION GAS SUPPLY.

The Past Year's Working.

The accounts of the Devonport Corporation gas undertaking for the year ended the 31st of March were presented to the Gas Committee last week, and show gratifying results in every respect. The revenue amounted to £55,934, and the expenditure to £41,702; leaving a gross profit of £14,232. After paying £7492 for interest and £4776 as an instalment off the loans, there is a net profit of £1964, compared with a net profit of £827 on the first year's working under the management of the Corporation. Of the income, £39,990 is from the sale of gas, and £13,785 from residual products; the balance being from miscellaneous sources, including £66 for the rental of stoves. On the expenditure side of the account are the following items: Manufacture of gas, £33,492; distribution, £1792; maintenance, £12; public lamps (lighting and repairing), £1236; residual products, £2368; rents, rates, and taxes, £1094; management, £1636; and bad debts, £68. The gas made was 330,529,000 cubic feet, compared with 295,929,000 cubic feet in the preceding year, or an increase of 34,600,000 cubic feet, or 11·69 per cent.; and the gas sold was 305,301,850 cubic feet, against 268,178,525 cubic feet—an increase of 13·84 per cent. The quantity of coal carbonized was 33,382 tons, against 30,162 tons in the previous year. The net cost of gas into the holder was 1s. 6d. per 1000 cubic feet, compared with 1s. 9d. before. The yield of gas per ton of coal was 99 feet more than in the preceding year. The number of ordinary consumers was 5118, compared with 4711, an addition of 407; while the consumers using automatic meters rose from 3212 to 4400, or by 1188. The increase in both classes was upwards of 20 per cent. The largest augmentation in the revenue took place in the automatic meters, which yielded 48·6 per cent. more than in the year 1902-3. The number of stoves on hire was 256. This was a new departure; the hiring of stoves having only been introduced last year. The gross profit for the year was 6·150 per cent. upon the capital employed, compared with 4·224 per cent.; while the number of consumers showed an increase of from 158·46 to 190·36 per mile of main. The price charged was the same in each year—viz., 2s. 6d. per 1000 cubic feet to ordinary consumers, and 3s. 4d. to users of automatic meters. The capital employed in the works equalled £700 14s. 1d. per million cubic feet of gas made, £6 18s. 9d. per ton of coal carbonized, and £24 6s. 4d. per consumer. The capital account shows a considerable increase. The purchase price of the undertaking under the award was £147,679 17s. 7d., and the cost of the arbitration and the award (£6053 11s. 3d.) raised the amount to £153,733 8s. 10d. On new works and extensions the outlay has been £56,732 19s. 7d. Of this sum, £7631 19s. was for the site of the extensions, £17,192 16s. 1d. for new works, £14,607 15s. 3d. for mains and services, £502 1s. 10d. for public lamps, £14,385 15s. 1d. for automatic installations, £1240 7s. 4d. for meters, and £1174 5s. for stoves.

GAS-WORKS EXTENSIONS AT ABERCARN.

Last year the Urban District Council of Abercarn determined to carry out extensive alterations in their gas-works. The old plant, especially in the retort department, was dilapidated and inefficient. All the extensions which the Council determined upon have now been carried out, and with very successful results. They consist of the necessary buildings—including retort-house, boiler-house, and engine-house—retorts, boiler, and exhausting plant. In the retort-house, a bench consisting of three arches (a setting of seven retorts in each) has been constructed, with separate steel hydraulic main to each arch, all the other fittings to correspond, and proper appliances for the removal of the tar from the hydraulic main. The retorts are single; the furnaces being of a specially powerful shallow regenerator type. A steel boiler, of first-class make, and very powerful engine and exhausting plant, capable of meeting future requirements, have also been erected. The three settings of 21 retorts, even with poor Welsh coal, produce 160,000 cubic feet of gas in 24 hours; being at the rate of nearly 8000 cubic feet per mouthpiece. The Contractors for the buildings, which were executed in local stone with white brick facings, were Messrs. Leadbeter Bros., of Newport; for the roofs, Messrs. Rees and Kirby, of Morriston; for the retort-settings and furnaces, Messrs. Westwood and Wrights, of Brierley Hill; for the boiler, Mr. J. Thompson, of Wolverhampton; and the engine and exhauster, Messrs. R. Laidlaw and Son, of Glasgow. The extensions were carried out to the plans and specifications and under the supervision of Mr. Thomas Canning, of Newport, Consulting Gas Engineer to the Council.

As noticed elsewhere, an exhibition of gas appliances has recently been held at Newbridge, under the auspices of the Council. It was opened by Alderman P. Wilson Raffan, who, in the course of his inaugural remarks, referred to the extensions described above. He said the great object the Council had in acquiring the gas-works was not so much to secure financial advantage as to popularize gas lighting in the neighbourhood, and make it easier for people to get gas into their homes. The Council had entered into an arrangement with the Richmond Gas Stove and Meter Company, whereby they were willing to supply, at exactly the same charge as was paid before—using penny-in-the-slot meters—three lights free in each house. They would also fix small cookers free, and the whole of the expense would be covered by the meter. The offer of the Company had been taken up very well, as he had been informed that already more than 200 consumers had given in their names, and that 150 of them had agreed to take the cookers. As a result of the extensions the Council had carried out at the gas-works, they were in a position to meet a largely increased consumption without adding practically anything to the standing charges. They were producing, on an average, 40,000 cubic feet of gas daily; and they had plant capable of turning out four times this quantity every day. Whether or not the gas-works would prove a valuable asset to the ratepayers, largely depended upon the people and upon whether the Council were able to get consumers so as to work the

plant nearer to its full capacity than at the present time. If they took advantage of the penny-in-the-slot installation throughout the district as had been done at Abercarn, they would not only be doing a good thing for themselves and their own homes, but also for the ratepayers, by increasing the consumption of gas, and making the undertaking a remunerative concern—thus bringing about a reduction in price.

BRUSSELS MUNICIPAL GAS SUPPLY.

Report of the Gas Committee for the Past Year.

The report of the Gas Committee of the Brussels Municipality for the year ending Dec. 31 last, which has lately been issued, shows that the total quantity of gas sold was 36,603,089 cubic metres, or 1292 million cubic feet, compared with 35,563,277 cubic metres, or 1255½ million cubic feet, in 1902. The total production of gas reached 42,047,270 cubic metres, or 1484¼ million cubic feet, against 41,681,230 cubic metres, or about 1471 million cubic feet, in the preceding twelve months. The entire bulk of gas was disposed of as follows :—

	Cubic Metres.
Lighting	27,402,184
Municipal and other establishments	1,437,057
Gas-engines	3,749,750
Heating purposes	3,721,759
Illuminating devices, balloons, &c.	72,061
Artisans' dwellings and miscellaneous	220,278
Total sold	36,603,089
Public lighting and illuminations	3,092,568
Used on the works, &c.	1,389,985
Unaccounted for	961,628
Total production	42,047,270

The total receipts amounted to 6,662,594 frs. (£266,504), and the expenses to 4,521,996 frs. (£180,880) ; leaving a balance of 2,140,598 frs. (£85,624). To this had to be added the amount by which the stores had increased in value 66,167 frs. (£2647); making the net balance 2,206,765 frs. (£88,271), against 1,778,499 frs. (£71,140) in 1902.

The portion of the report dealing with the manufacturing operations shows that 110,918 tons of coal were carbonized, and 3714 tons of oil employed for enrichment, &c., last year, compared with 95,836 tons and 5026 tons respectively in 1902. The quantity of solid material was consequently more by 15,082 tons, and of liquid less by 1312 tons. The sale of coke in Brussels and the neighbourhood was very regular throughout the year ; and at the close there was none in stock. Tar and sulphate of ammonia were in good demand, at remunerative prices; but, on the other hand, considerable loss resulted from the sale of the cyanides. As usual, the breeze was utilized in the manufacture of compressed fuel, which is employed in heating the retorts. Nearly all the ashes produced on the works were sold for making mortar and repairing the roads. Extensions of works and mains caused an expenditure of 616,580 frs. (£24,663) last year; increasing to 30,323,565 frs. (£1,212,943) the total capital employed.

During the twelve months covered by the report, 1730 yards of new mains were laid. The number of meters in use at the close of the year was 35,602, or 1813 more than at the corresponding period of 1902. There were 240 prepayment meters fixed ; bringing up the total to 3878. The rising mains were increased by 319 ; making the entire number in use at the end of the year 5379. Of interior installations, 940 were fitted up ; so that there are now 13,816 in use in the city. The gas-stoves on hire number 26,118, against 25,023 at the close of 1902 ; and the gas-engines, 411, compared with 394—representing 4231-horse power against 4160-horse power. For public lighting, 6674 lanterns, all fitted with incandescent burners, are employed.

ELECTRIC LIGHTING AT DARTFORD.

An Unprofitable and Unsatisfactory Business.

At the last Monthly Meeting of the Dartford Urban District Council, the Chairman of the Electric Lighting Committee (Mr. Hesketh) had to make what must have been a very unwelcome statement. He said the accounts had been got out for the past half year, and the Council were not quite in so good a position as he had hoped they would be. He fully anticipated that in the winter six months they would show—not, perhaps, a profit, but a covering of the whole of the expenses which electric lighting had entailed. But their position was that, though with their receipts they could pay the interest on the capital, they could not provide the proportion of repayment due ; and this would have to be taken from the rates. This disappointment principally arose in two ways. In the first place, they had expected, with the refuse destructor, to get a great deal off their coal bill ; but the amount of refuse available was only sufficient to raise steam for running the pumps at the sewage-pumping station, and so there was no margin for the generation of electricity. Secondly, the larger establishments which had been expected to require a supply were only now beginning to do so. But they would feel the benefit of them very soon. He assured the Council that everything had been done to keep down the expenses ; and they meant to make the lighting pay as soon as possible. The Vice-Chairman (Mr. Putland) asked the members of the Council to "put their shoulders to the wheel," and make the electricity undertaking a big success. He had been met by the remark—and it was a just one—as to why he did not influence people on the Council to support the undertaking, and then he might better induce others to do so. He hoped the members would feel that they should use the light as much as possible, and then, possibly, they would get over their difficulty.

It would appear, from these remarks, that the ratepayers are not particularly enamoured of their new venture. At all events, they are not displaying very great eagerness to take the electric light. The reason for this is shown in a letter addressed to a local paper by Mr. C. A. Moorby—writing, presumably, on behalf of a firm. He relates his experience as follows : "Personally, we are not at all surprised at the result of the twelve months' working, for, however disappointing the accounts may be, the light itself, when one has got it, is much more so. We were foolish enough, some twelve months ago, to take over wires and fittings that had been put in by the Council for the previous tenant, and to sign an agreement to retain the same for three years, paying rental during that period—the Council, in consideration of this, to keep the fittings in working order. A twelvemonth's trial has resulted in a most wretched light at frequent intervals—being in darkness either inside or outside of the premises every few weeks, owing, as the Engineer says, to the lamps, and not the fittings, going wrong, from which we beg to differ. On one occasion we were kept four nights without lights, although notice that they had failed was promptly sent by one of the Council's servants, who assures us that it was duly delivered. Added to all this inconvenience and bother, we must pay for current used and rent for the hire of meter and fittings ; also for new burner on Dec. 14, again on the 22nd, and again on Jan. 16, and the men's time for repairing the lights. At last our patience gives out, and we plainly state (in a strong letter) that we can put up with this humbug no longer ; giving instructions for the current to be cut off, and the fittings removed, as we must go back to the gas again. At this our attention is promptly drawn to the 'red tape' by which we have allowed ourselves to be bound, and we are very politely informed that if we discontinue using the current the Council cannot release us from the terms of the agreement. Finally, we receive a notice from the Clerk to the Council threatening proceedings if the two years' rent of fittings (up to March, 1906) is not paid within seven days. After which payment, the Council will at once remove the fittings." Yet, adds Mr. Moorby, the Council are asking, "Why don't the public use the electric light?" He says he does not hold any brief for the Gas Company, but he contends that they are better friends than the electricity people. There is not so much "red tape" about them ; they do not ask consumers to put their hands so deeply into their pockets ; and they give them better value for their money. Mr. Moorby has shown his wisdom by getting rid of the troublesome illuminant ; for he says three high-pressure incandescent burners are now doing duty for five electric lamps, with more satisfactory results, at about one-half the cost. This is his answer to the Council's question—and a very unequivocal one it is.

COMPARATIVE COST OF GAS AND ELECTRICITY.

A Gas Engineer's Calculations.

In a paragraph which appears in our editorial columns, reference is made to some comparisons of the cost of gas and electric lighting which were published in the "Daily News" on Monday last week. As they occupied a prominent position in the paper, it was not likely that they would escape the notice of managers and others interested in the supply of gas, among these being Mr. J. H. Brown, the Engineer and General Manager of the gas undertaking of the Nottingham Corporation. Mr. Brown was not the man to allow them to pass unnoticed ; and accordingly he did good service to the public, as well as to many of his colleagues in the gas profession, by at once sending to the "Daily News" a few calculations of his own, which were inserted in Wednesday's issue. We give his letter below.

To the Editor of "The Daily News."

Sir,—The comparisons you give in to-day's article are based on the definite statement made that electricity at 5d. per unit for lighting and 1½d. for power is equivalent to gas at 2s. 6d. per 1000 cubic feet for lighting and 1s. 3d. per 1000 cubic feet for power. One unit of electricity—one Board of Trade unit or one kilowatt—is equal to 1000 watts ; 746 watts are required to produce 1-horse power. Therefore 1 unit produces a little less than 1¼-horse power, and at 1½d. per unit 1d. will yield 8-9ths of a horse power. Any gas-engine maker will guarantee to produce 1-horse power for a consumption of 15 cubic feet of gas. Therefore, 1000 cubic feet of gas will produce 66-horse power ; and to cost the same as electricity at 8-9ths of a horse power for 1d., gas must be sold at (66 divided by 8-9ths) 74d., or 6s. 2d. per 1000 cubic feet.

Turning to the question of lighting. The incandescent electric lamp will produce when new 1-candle power per hour for a consumption of 4 watts. Therefore the unit of electricity will produce 250-candle power per hour for 5d. With gas at 2s. 6d. per 1000 cubic feet, 5d. would buy 166 cubic feet ; and with the ordinary flat-flame or batswing burner, producing 16 candle-hours, with a consumption of 5 cubic feet of gas, 166 multiplied by 16, divided by 5, or 528 candle-hours, would be obtained for 5d., or more than double the light obtained for the same expenditure with electricity. But with the modern incandescent burner, which will easily produce from 12 to 24 candles per cubic foot of gas per hour, 166 multiplied by 12, or 1992 candle-hours, will be obtained for 5d. Or, in other words, electricity for lighting at 5d. per unit is equivalent to gas at 1s. 3d. per 1000 when consumed in the now almost obsolete flat-flame burner, or equivalent to gas at 4d. per 1000 when consumed in incandescent Welsbach burners. The foregoing are neither conjecture nor hearsay, but statements of actual facts, which I am quite prepared to prove on a standard stamped photometer to any electrician or scientist.

Pipe-Lines for Natural Gas.—We learn from "Engineering" that a pipe-line is to be laid from Chanute, Kansas, to St. Louis, Kansas City, and St. Joseph, to convey natural gas. The plans are prepared, the capital is available, and the wells are already drilled. The Company will start with more than 100 wells, and a daily capacity of 300 million cubic feet of gas, which is little less than the present daily consumption of the United States. The line from Chanute to Kansas City will be laid first—the distance being more than 110 miles. The line to St. Louis will come later, and will be upwards of 200 miles long. The Company who own the wells and will lay the pipe-lines is composed largely of those who own the Union Natural Gas Corporation of Pittsburg—one of the largest producers of gas in the Eastern fields of the United States.

GAS AND ELECTRIC LIGHTING AT LONGTON.

A Valuable Asset.

A Special Sub-Committee who have been investigating the financial position of the borough of Longton, last Thursday week presented a fourth interim report to the Town Council.

Referring to the gas and electricity works, the Committee said that their inquiries had been somewhat restricted, in consequence of most of the books in use prior to 1898 having been destroyed, for which action they believed the present staff were not responsible. The gas undertaking was purchased in 1877; and the amount paid, inclusive of costs, was £77,663. Compared with similar concerns purchased by other authorities, the price paid was reasonable; being at the rate of £200 for every £100 of share capital, the Company at that time paying a dividend of 10 per cent. The additions which had been made to the works since the purchase (and which included a new retort-house costing £20,000, and water-gas plant costing £8000), reached the large total of £140,449. The electric light installation cost £21,000 in addition—making a total cost on capital account up to date of £161,449. The repayments to the present time amounted to £27,732, leaving a liability of £133,717. It would be seen therefore that the Corporation possessed a valuable asset, which in course of time might be looked upon as likely to be of much greater benefit to the town than it was even now. Their investigations satisfied them that the works were under most efficient management. Every part was fitted with modern and up-to-date appliances; and the prospect of a most successful career was, to their minds, assured.

GERMAN ASSOCIATION FOR THE SALE OF COKE.

A short time ago, a meeting was held in Cologne, under the presidency of Herr Söhren, the Manager of the Bonn Gas-Works, for the purpose of forming an association for the sale of coke and other residual products of gas manufacture. Those who attended the meeting were representatives of the Economic Union of German Gas-Works—an organization comprising 160 works in various parts of the empire. The outcome of the conference was the adoption of a set of rules, of which the following are the principal features: The gas-works in the north, west, centre, and south of Germany, which have since 1889 formed part of the Union, will constitute the Association, the headquarters of which are to be in Cologne. The object is to find the most remunerative markets for residuals, and, should the necessity arise, purchase materials for use in the works. The Association will have the legal and commercial status of a company, and the shares will be of the nominal value of 200 marks each, and not be transferable. The Association is to continue in existence for five years; but it may be dissolved by a majority of four-fifths of the total number of votes available. It may be prolonged beyond the five years, if so determined at the expiration of the fourth. The financial year is from April 1 to March 31. The capital is fixed at 100,000 marks, to be contributed by the members in the following proportions: Where the make of gas is less than 35 million cubic feet, 400 marks; from 35 to 175 millions, 800 marks; upwards of 175 millions, 1200 marks. The amount to be first paid will be 25 per cent. of these sums; the remainder to be taken up on behalf of the largest works, and eventually handed over to new-comers.

The affairs of the Association will be conducted by the Administrative Council, the General Committee, and the Committee of Management. There is to be an annual meeting, held at the latest in May, at which the report and accounts are to be presented, and the office-bearers elected. The Committee of Management will attend to all sales, keep the revenue and expenditure accounts, and report monthly to the Administrative Council. The General Committee, composed of from ten to fifteen members, who are to be managers of gas-works, will fix the price of coke, define the limits within which it is to be sold from each works, and settle disputes between members and the Committee of Management. Coke employed in the production of water gas is to be considered as saleable; but that utilized in carrying on the works is not to be so regarded. Large, broken, screened, and small coke are all saleable; and one vote is to be allowed for each 1000 metric tons produced. Several works may combine to obtain one or more votes. Before the 1st of February, members are to advise the Committee of Management as to their available quantity of coke, and promptly attend to all orders that may reach them; but they cannot individually arrange sales. The Association will endeavour not to compete with the managers in what may be called their natural market—that is to say, in the district surrounding the works. Prices are fixed according to localities determined at the annual meeting on the proposition of the General Committee. The total bulk of coke sold in the preceding year must be notified to the Association before the 1st of February, and a tax of 5pf. per ton paid in advance. This tax will be subsequently altered in accordance with the amount of the administrative expenses. Profits derived from the sale of any particular coke will be placed to the credit of the works supplying it. Infringement of the rule in regard to notifying the quantity of coke produced and attending to orders is to render the offending members liable to a fine of 20 marks per ton of coke sold.

Suicide by Gas.—The Paris correspondent of the "Daily Chronicle" describes the suicide of a commission agent, who enveloped his head in a pillow-case (tying the open end tightly round his neck), and then introduced an india-rubber pipe attached to a gas-jet through a hole previously made, and turned on the gas. His wife, entering the kitchen shortly afterwards, found him dead; the pillow-case being distended like a balloon.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 565.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 14	10½	Alliance & Dublin 10 p.c.	20–21	..	5 0 0
100,000	10	,,	7½	Do. 7 p.c.	13–14	..	5 7 2
200,000	5	May 12	6½	Bombay, Ltd. . . .	6–6½	..	5 4 0
140,000	5	,,	6½	Do. New, £4 paid	4⅝–5¼	..	4 18 11
300,000	Stk.	Feb. 25	12	Brentford Consolidated	242–247	+2	4 17 2
300,000	,,	,,	9	Do. New . . .	182–187	+2	4 16 3
50,000	,,	,,	5	Do. 5 p.c. Pref. .	127–132	..	3 15 9
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb. .	103–108	..	3 14 1
220,000	Stk.	Mar. 10	10⅝	Brighton & Hove Orig.	212–217	..	4 19 1
246,320	,,	,,	7½	Do. A. Ord. Stk. .	150–155	..	5 0 0
460,000	20	Apl. 14	10	British	38¼–39¼	..	5 1 3
100,000	Stk.	Feb. 25	6	Bromley, Ord. 5 p.c. .	114–118	+1½	5 1 8
165,700	,,	,,	4½	Do. do. 3½ p.c. .	87–92	+2	4 17 10
500,000	10	May 12	7	Buenos Ayres (New) Ltd	10¾–11¼	..	6 4 5
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93–95	..	4 4 3
150,000	20	Mar. 10	7½	Cagliari, Ltd. . . .	21–23	..	7 3 6
100,000	10	May 27	10	Cape Town & Dis., Ltd.	14–15*	+½	6 13 4
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	51–53	..	5 13 2
1,375,000	Stk.	Feb. 25	5⅝	Commercial 4 p.c. Stk.	105–110	..	4 14 6
536,485	,,	,,	5	Do. 3½ p.c. do.	103–106	..	4 14 4
442,947	,,	Dec. 11	3	Do. 3 p.c. Deb. do.	86–88	..	3 8 2
800,000	Stk.	Dec. 30	7	Continental Union, Ltd.	115–120	..	5 16 8
200,000	,,	,,	7	Do. 7 p.c. Pref.	140–145	..	4 16 7
575,000	Stk.	Feb. 25	5⅛	Crystal Palace Ord. 5 p.c.	118–123	..	4 6 8
60,000	,,	,,	5	Do. 5 p.c. Pref. .	120–125	..	4 0 0
112,533	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.	135–138	..	3 12 6
486,090	10	Jan. 28	10½	European, Ltd. . . .	18½–19½	..	5 7 8
354,060	10	,,	10½	Do. £7 10s. paid	13¼–14¼	..	5 8 8
15,243,200	Stk.	Feb. 11	4⅛	Gas- { 4 p.c. Ord. . .	94–96	..	4 11 8
2,600,000	,,	,,	3½	light { 3½ p.c. max. .	89–91	..	3 16 11
3,799,735	,,	,,	4	and { 4 p.c. Con. Pref.	108–111	+1	3 12 1
4,193,975	,,	Dec. 11	3	Coke { 3 p.c. Con. Deb.	87–89	..	3 7 5
258,740	Stk.	Mar. 10	5	Hastings & St. L. 3½ p.c.	90–95	..	5 5 3
70,000	10	Apl. 28	11	Hongkong & China, Ltd.	15–16	..	6 17 6
3,800,000	Stk.	May 12	10	Imperial Continental .	202–205	–1	4 17 7
473,600	Stk.	Feb. 11	3½	Do. 3½ p.c. Deb. Red.	97–99	–1	3 10 8
165,242	Stk.	Mar. 10	6	Lea Bridge Ord. 5 p.c.	113–118	..	5 1 8
561,000	Stk.	Feb. 25	10	Liverpool United A .	215–216	+3	4 12 7
718,100	,,	,,	7	Do. do. B .	159–161	..	4 6 11
306,083	,,	Dec. 30	4	Do. do. Deb. Stk.	108–110	..	3 12 9
75,000	5	Dec. 11	5	Malta & Medn., Ltd. .	4¼–4⅝	..	5 5 3
560,000	100	Apl. 5	5	Met. of { 5 p.c. Deb.	100–103	..	4 17 1
250,000	100	,,	4½	Melbourne { 4½ p.c. Deb.	102–102	..	4 8 3
541,920	20	May 27	3½	Monte Video, Ltd. . .	9–10*	..	7 0 0
1,515,892	Stk.	Feb. 26	4½	Newc'tle & G'tesh'd Con.	103–104	..	4 6 7
406,025	Stk.	Dec. 31	3½	Do. 3½ p.c. Deb.	93½–94½	..	3 14 1
300,000	Stk.	May 12	8	Oriental, Ltd. . . .	135–140	..	5 14 4
600,000	5	Mar. 29	7	Ottoman, Ltd. . . .	5⅞–6⅛	..	5 12 0
				* Ex div.			

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
205,005	Stk.	Jan. 14	6½	Ply'mth & St'house 5 p.c	121–126	..	4 17 2
851,070	10	Apl. 28	7	River Plate Ord. . .	11–11½	..	6 1 9
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. .	95–97	..	4 2 5
250,000	10	Mar. 29	7	San Paulo, Ltd. . . .	11–12	..	5 16 8
135,000	Stk.	Mar. 10	10	Sheffield A	237–239	..	4 3 8
209,984	,,	,,	10	Do. B	235–237	..	4 4 5
523,498	,,	,,	10	Do. C	234–236	..	4 4 9
116,106	Stk.	Mar. 29	5	Shrewsbury Ord. 5 p.c.	107–110	..	4 10 11
6,150,000	Stk.	Feb. 11	5⅛	South Met., 4 p.c. Ord.	125–127	..	4 3 11
1,832,700	,,	Jan. 14	3	Do. 3 p.c. Deb. . .	87–89	..	3 7 5
380,940	Stk.	May 12	5	Southampton Ord. . .	105–110	+2	4 10 11
87,950	,,	Jan. 14	4	Do. 4 p.c. Deb.	100–103	..	3 17 8
120,000	Stk.	Feb. 25	6	Tottenham and Edmonton { A. 5 p.c. / B. 3½ p.c.	120–125	..	4 16 0
313,020	,,	,,	4½		97–102	..	4 8 3
182,380	10	Dec. 30	8	Tuscan, Ltd.	8¼–9	..	8 17 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97–99	..	5 1 0
745,872	Stk.	Mar. 10	5	West Ham, 5 p.c. Ord.	97–102	..	4 18 0
				WATER COMPANIES.			
781,517	Stk.	Dec. 30	12	Chelsea, Ord. . .	358–363	+3	3 6 2
150,000	,,	,,	5	Do. 5 p.c. Pref. .	142–147	..	3 8 0
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	132–137	..	3 5 8
175,785	,,	Mar. 29	4½	Do. 4½ p.c. Deb. .	132–137	..	3 5 8
1,720,560	Stk.	Mar. 29	8	East London, Ord. . .	220–225	+2	3 11 1
654,740	,,	Dec. 11	4½	Do. 4½ p.c. Deb. .	134–139	..	3 4 9
1,524,288	,,	,,	3	Do. 3 p.c. Deb. .	89–92	..	3 5 2
700,000	50	,,	10	Grand Junction { 10 p.c. max. . / 4 p.c. Deb. .	137–140	..	3 11 5
310,000	Stk.	Mar. 29	4		115–120	..	3 6 8
708,000	Stk.	Feb. 25	10	Kent	318–323	..	3 2 4
160,000	,,	,,	7	Do. New, 7 p.c. max. .	220–225	..	3 2 3
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max. .	315–320	+1	3 8 9
496,200	100	,,	8½	Do. 7½ p.c. max. .	228–233	..	3 13 0
350,000	Stk.	Mar. 29	4	Do. 4 p.c. Deb. .	115–120	..	3 6 8
500,000	100	Feb. 25	10	New River, New Shares	360–370	..	2 14 0
1,000,000	Stk.	Jan. 28	4	Do. 4 p.c. Deb. .	118–121	..	3 6 2
902,300	Stk.	Dec. 30	7½	South-wark and Vauxhall { Ord. . . / 7½ p.c. max. / 5 p.c. Pref. . / 4 p.c. A Deb.	275–280	..	2 13 7
126,500	100	,,	7½		215–225	..	3 6 8
489,200	Stk.	,,	5		144–149	..	3 7 1
1,019,585	,,	Mar. 29	4		115–120	..	3 6 8
1,155,066	Stk.	May 27	10	West Middlesex. . .	295–300*	+3	3 6 8
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	132–137	..	3 5 8
200,000	,,	Mar. 10	3	Do. 3 p.c. Deb. .	89–92	..	3 5 2
					* Ex div.		

TYNEMOUTH WATER SCHEME.

The Tynemouth Corporation last week paid a visit to the Font Water-Works; invitations being also sent to representatives of the different Councils on the east coast of Northumberland to join the party, so as to judge for themselves whether or not it would be to the benefit of their authorities to take their water supply from the Font or from other sources. After the inspection of the works, the company were entertained to luncheon, under the presidency of the Mayor of Tynemouth (Alderman Spencer), who was supported by the Chairman of the Water Committee (Alderman Elliot).

The watershed, which is practically uninhabited, covers an area of 74,000 acres. The average rainfall for the past six years has been 36 inches; but the calculations have been based on the fall for three dry years (34 inches), which will give an average flow of 5¼ million gallons a day. The embankment which spans the valley is 1100 feet long, and has two arms, which run out to 1500 feet. The area of the reservoir will be 88 acres, with a maximum depth of 80 feet of water. This will give a storage of 730 million gallons, equivalent to 180 days' supply. The height of the embankment will be 90 feet from the bed of the stream; and the width of the base is 600 feet. In order to allow of the work being carried on, it was necessary to divert the stream through a tunnel 650 feet long; and when the reservoir is completed, this tunnel will be used for the purposes of carrying off the overflow and the compensation water—the latter amounting to 1½ million gallons per day. The supply-pipe is also carried through the tunnel. There are to be five filter-beds, each having an area of ¾ acre; and they will be capable of dealing with 3¾ million gallons daily. An 18-inch main is laid from the Font to Tynemouth, and will carry about 3 million gallons per day. The whole scheme is estimated to cost £430,000. The buying up of the North Shields Water Company involved an expenditure of £75,000, and £20,000 was spent on extensions. The power of supply when the Company was bought up included only the borough of Tynemouth, Whitley Bay, and Monkseaton. Under the Corporation's present powers, however, they can supply other authorities, and have offered to do so. It is not expected that the Font reservoir will be completed for three or four years; but meanwhile water can be sent from the distributing house through the district.

Under the auspices of the Abercarn District Council, an exhibition of gas cooking-stoves by the Richmond Gas Stove and Meter Company, Limited, was held in the Public Hall, Newbridge, a few days ago. It was opened by Alderman P. Wilson Raffan, who explained that the Council had arranged with the Company to fit up free installations of stoves and fittings on the penny-in-the-slot system, and urged the inhabitants of the district to avail themselves of the privilege. In connection with the exhibition, cookery demonstrations were given by Miss E. Turnbull.

HALIFAX CORPORATION WATER SUPPLY.

Cost of the Walshaw Dean Scheme.

At the Halifax Town Hall, on Thursday, an inquiry was held by Colonel W. R. SLACKE, R.E., one of the Inspectors of the Local Government Board, into an application made by the Corporation for authority to borrow £86,765 for the completion of the reservoirs at Walshaw Dean and other water-works purposes. Objection was raised to the application on behalf of the Halifax Ratepayers' Association, whose representatives were in attendance. They complained that the original estimate for the works had already been exceeded by about £55,000; and the ratepayers were opposed to these large supplementary estimates being continually brought forward.

The TOWN CLERK (Mr. Keighley Walton) explained that authority had been obtained under the Act of 1898 to borrow £157,000 for works in the Walshaw Dean Valley and other water-works purposes. The Corporation had obtained full authority to carry out all the work that had been done, except with regard to the afforestation scheme. There were no special powers obtainable for this; but local authorities were encouraged to carry out such work, both by the Board of Agriculture and the Local Government Board.

Mr. *H. P. Hill* (of Messrs. G. H. Hill and Sons) said his firm had prepared the estimate for the Walshaw Dean reservoir scheme, the original estimate put into the Act of 1898 being £157,000. The work was commenced in 1901; the Contractor being Mr. Enoch Tempest, whose tender totalled to £170,766. This covered everything shown on the drawings deposited with the Act and mentioned in the Engineers' estimate. In carrying out the works, they had found it necessary in some cases to go a great deal lower than they had anticipated. There had also been additional work not originally estimated for, in the way of beaching on the sides of the reservoir and the removal of peat. The estimate of £157,000 was prepared in connection with an application for powers made long before 1898. So far as he knew, there had been no boring before the work was commenced.

The INSPECTOR: There is no record of any boring or of any revision of the original estimate?

The TOWN CLERK remarked that it was hardly correct to say definitely that there had been no boring. There had been no evidence brought forward to show whether there had been boring or not. It was just possible that they might find records of boring if they searched the documents relating to the earlier applications made by the Corporation to carry out the Walshaw Dean scheme.

From further explanations given to the Inspector, it appeared that the estimate of £157,000 had originally been got out in connection with an application for parliamentary powers made as long ago as 1868 or 1875, and the same estimate had been used when the Corporation applied for the authority under which the present works were being carried out.

The INSPECTOR: You ought to have applied for a larger amount.

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What I cannot understand is why there was no revision of the estimate; because it must have occurred to you that the expenditure would be greater than your estimate of £157,000 prepared some time before.

Other details of proposed expenditure having been gone into,

The INSPECTOR intimated that he would hear any objections offered to the application.

Mr. E. HALEY, speaking on behalf of the Ratepayers' Association, said the scheme before the Inspector was a sample of others that could be adduced where the Corporation had carried out works largely in excess of the estimates. He agreed with the Inspector that it was an improper proceeding on the part of the Corporation to apply to Parliament to sanction a loan of £157,000 when it was evident that such a sum would not be adequate for the accomplishment of so great a scheme. No sooner had they obtained the powers to carry out the works than they let the contracts at a sum much above the estimate; and from that time the expenditure had gone on growing until it had reached an aggregate of nearly £234,000, or a total increase of £76,475 on the original estimate. He condemned the practice of the Corporation of putting forward modest estimates for the construction of public works, and not disclosing the full particulars of the scheme.

The INSPECTOR interposed with the remark that what he had to consider was opposition to the particular application before him, or any part of it. He had nothing to do with anything else.

Mr. HALEY: Well, we cannot obstruct this. We cannot let the works lie derelict after all this expenditure upon them. But we protest against the practice of putting forward a modest estimate, and then continually bringing up large additions.

The INSPECTOR remarked that this was a matter for the ratepayers when they came to elect their representatives on the Council.

Mr. HALEY said the ratepayers had not the satisfaction even of knowing whether this latest estimate was a final one, because the Corporation had already decided on further alterations. He went on to say he was glad the Inspector had asked for the authority for carrying out certain alterations which had been made. The Local Government Board had on previous occasions objected to the expenditure of money before permission to borrow it had been obtained, and had threatened that if the practice were continued they might refuse their sanction. He thought a little good would be done if the Board were to carry out their powers in this direction. He objected to the afforestation at Ogden, by which the Corporation were converting good pasturage into forest land, and also to a loan being granted for new offices, as these should be paid for out of revenue. They were piling up their capital account in Halifax so enormously that, unless some restraint were placed on the Corporation, the burden of the burgesses would become unbearable, and many of them would seek other quarters to reside in. He was doubtful, too, whether there was any real justification for all the heavy expenditure incurred in beaching and pitching at Ogden. For many years it had been the boast of their town that they had the purest water supply in the kingdom; but of late it seemed that they could not be satisfied with rubble at the bottom of their reservoirs, but must go in for more expensive things. There had been a large expenditure of money which he thought was unwise, and in some cases quite unnecessary; and this outlay had been incurred without any sufficient return. Their income from water was most meagre; and he believed all the water collected in these reservoirs would have to be sold to outlying districts, who would not bear the burden. The income during the last seven years from water had only increased by £4601. He considered that on these grounds the ratepayers were justified in asking the Local Government Board to carefully scrutinize the application of the Corporation in the interests of the burgesses.

Mr. RILEY PATCHETT wished to know how much of the money mentioned in the application had already been spent.

Mr. NICHOLL (the Borough Accountant) explained that up to date £139,176 had been laid out altogether on the Walshaw Dean works.

Mr. A. CRAWSHAW asked if the Corporation had ever made a halfpenny out of their water. He contended that they were selling at a loss to outside districts; and the ratepayers of the town were having to lay out as much as £273,000 to supply those places. The speaker proceeded to draw a comparison with Brighouse, which he said was clearing £500 profit out of the water they bought from Halifax and sold again, while Halifax was £10,661 to the bad.

The INSPECTOR: Well, I will take a note of your opposition.

Mr. CRAWSHAW: I wish you would; and I wish you would stop them from going on like this.

Mr. J. PARKER (the Chairman of the Water Committee), replying to Mr. Haley's criticism, said that all the Committee had done at Ogden in the way of beaching was to put down a rubble base on a filthy clay foundation. Whatever might have been the analysis of Ogden water in years gone by, its condition now was such as to force the Corporation to deal with the matter. As to afforestation, it was recommended for catchment areas as a means of improving the supply and condition of the water. Mr. Haley said they were converting good fields into forest. This was quite true; but the fact was that they did not want good fields manured right down to the edge of their reservoirs. With regard to their profits, Mr. Haley had not explained that in Halifax the houses and cottages were allowed a bath and a water-closet each, without extra charge for water. This meant a considerable loss of revenue; but it also meant improved health. So far as the outside supply was concerned, he might point out that the Corporation were bound to supply the places specified in their Act of Parliament, and it was useless to browbeat the Committee because Brighouse made a profit on its water and Halifax did not.

The inquiry then terminated, and the Inspector subsequently visited the works in respect of which the borrowing powers were sought.

Further Inclines for Swansea.—The Swansea Gas Company have accepted the tender of Messrs. Drakes, Limited, for the erection complete of twelve beds of inclined retorts, with coal and hot-coke conveyors, to the drawings and specifications of the Engineer and Manager, Mr. Thornton Andrews, M.Inst.C.E.

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

With the formation of the Eastern District Association of the Scottish Junior Gas Association at the meeting in Edinburgh to-night (see p. 574), the movement has certainly been placed on a basis from which it will only be dislodged by the action, or, on the other hand, the inaction, of those who have enrolled themselves. It can be truly said that no movement could have had a better send-off than this has had. The two leading Gas Engineers in these northern parts have vied with each other in their desire to be of service. About three weeks ago, Mr. Wilson, in his own town, laid the juniors over a wide area under a deep obligation for his spirited pleading of a cause which, if they take advantage of it, will do them, as a body, more good than can well be anticipated. To-night Mr. Herring, taking the chair in his district, placed the matter in a light which makes the bearings of the whole movement clear and unmistakable. Both gentlemen perceive that the welfare of the gas industry depends, more than anything else, upon the training of those who are to lead it in the days when they have retired from it; and with an unselfishness which commands admiration, they have set about the task of instructing those who aspire to better things how to achieve success. There is the double purpose of bettering the individuals and of elevating the profession. We all know that for years gas making was not fashionable with those whose duty it was to see to the placing of youth out in the world. This feeling is passing away. Gas engineering is taking rank; and it behoves those who are already upon the ladder to see that they are not outstripped by some, more highly favoured, who, by superior class training, may justly look for the higher posts falling into their hands. The value of Junior Gas Associations ought to be found in their lifting-up of the worker so that he should be in a better position, not alone for doing his work, but for the display of his abilities—thereby placing him more on a level with rivals whose opportunities for study have been more ample. It is so difficult, however, to forecast the trend of events, that it is just possible that the effect will be the other way, and that the class-trained youth will find in the Associations the means of acquiring that technical knowledge which he either has not time, or has not the inclination, to pick up before he makes the attempt to scale the heights. If such should, unfortunately, turn out to be the case, the Associations would not long exist, for it would be too much to expect that men should voluntarily meet and convey to others the means of outstripping them. It is in this connection that the resolution to admit those who are being trained as engineers or chemists comes to be of importance. In their admission there is an element of danger to the success of the Associations which apparently was not realized. The growth of any tendencies towards stratification of the membership should be carefully repressed; and probably the best corrective to any such evil may be found in the guidance which the Associations may take for granted they will receive from high quarters.

The last time I referred to the subject of the provision of new gas-works for Falkirk, I wrote that it was now almost a certainty that they would go on. The word "almost" was used in view of the many ups and downs which the proposal has had; and it was a happy use, because the scheme has received another check. It is over the railway communication that the difficulty has again arisen. The same subject has been the main obstacle all along. So far as can be made out, the North British Railway Company, who are to provide the railway connection, seem to be desirous of shifting a goods yard to a site near the new gas-works, and the General Manager of that Company has refused to sanction the construction of the railway line unless he receives concessions from the Town Council as to running powers—perpetual shunting powers—over part of the burgh roadways. In order to counter-check the Railway Company, the Gas Committee, at the last meeting of the Town Council, threw out the suggestion that the Corporation should themselves construct the railway, and hire out connections from it to other public works in the neighbourhood. Mr. H. Russell, the Convener of the Gas Committee, said that if there was one thing which the Committee had made an earnest endeavour in, it was to bring this matter to a finish. He was sorry to say that they had not been very successful. The Committee now thought that the Corporation should make the railway themselves. It was absolutely necessary that something should be done to get a start with the new works at once; and he thought they would see the force of this when he told them that, so long as they continued to carry on their business in the old works, they were losing a sum of £4000 per annum—this being the amount that would be saved if they had modern works. If they did not proceed with the erection of the works now, they might as well wait until another year; and if they wished to have the benefit of them during the winter of 1905, there was no time to be lost. He moved that they enter into negotiation with the owner of the ground for power to make the railway themselves. An amendment was moved that they do not make the railway. It was mentioned in the course of the discussion upon the proposals that the General Manager of the Railway Company had stated that the capital outlay upon the railway would be £10,000—this, of course, including the larger scheme of a new railway yard—and that their own Manager (Mr. W. M'Crae) had estimated that they could make a railway for £3000. The subject did not go to a vote, as it was pointed out that all that was wanted was power to ascertain the cost, and that the Council would again be consulted. The Council agreed that Mr. M'Crae and Mr. Ronald should look into the matter of cost, that the Committee should ascertain upon what terms land might be got, and that the whole matter should be reported to the Town Council. In the course of the same evening, the Council accepted estimates for the erection of the buildings of the new works; but it was conditional upon the railway question being settled. What success the Corporation may have in this new encounter with the Railway Company remains to be seen; but I cannot banish from my mind the thought that, even if the Corporation construct the railway, they will have to arrange with the Company to work it.

Pending the early publication of the results of last year's working of

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Works: LONDON AND EXETER.

the Dundee Corporation Gas-Works, it is a pity to recur to the conjectures which are being indulged in by the local Press upon the subject. They are worming out information in driblets, which is an unsatisfactory way, both to the public, who have to bear with a great amount of repetition, and to the undertaking, which has to bear the risk of erroneous information being mixed up with what may have a foundation in truth. I only yield to the temptation to take notice of one of the fully-headed articles which have appeared this week, because it mentions the important fact that, by the use of machinery in the retort-house, Mr. Yuill has brought down carbonizing charges, which formerly were a heavy item of expenditure, to not more than 2s. per ton; and he also mentions that there is likely to be a reduction of 3d. per 1000 cubic feet in the price of gas.

An article was published in the "Glasgow Herald" on Tuesday last on "Peat and its Use as a Fuel," which brought out that a Company have been at work for two years at Barnahill, on the Crinan Canal, condensing and drying peat for fuel purposes. The product, it is claimed, possesses a very high heating power. Charcoal produced from peat at Barnahill has, it is said, been used in the manufacture of both iron and steel; and the metal thus smelted was of a very high class. Experiments have also been made with the gas produced when converting the peat into charcoal. Some 50 tons of the condensed peat were sent to a works for this purpose, and the gas produced was used in a Siemens-Martin furnace; "and although," it is said, "it is understood that most excellent castings were made, the proper way of producing the gas was not used, as the mode of making it quite pure and of the greatest heating power has been kept a secret. If, therefore, the pure gas had been used, an even better metal would most probably have been produced. The peat gas has been used in Sweden for smelting purposes, but without the extra purifying process, which increases the heating power. To show the purity of the peat charcoal produced at Barnahill, on an analysis being taken, without the silica being extracted, it showed clearly that the fuel contained 96·7 per cent. of carbon."

Speaking at the opening of an exhibition of gas appliances in Arbroath on Monday, Mr. Robbie, the Convener of the Corporation Gas Committee, said that gas-cookers had been very popular in the town since the exhibition held in 1902. There were no slot cookers then in the town; to-day there are 526 in use. In 1902, there were 123 ordinary cookers in use, and there are now 167; making a total of 690 cookers introduced in two years. They had been able, by means of these cookers and otherwise, to increase the make of gas by 5,550,000 cubic feet, which was equal to a revenue of £1240. Notwithstanding this increase, they had received £1627 less from consumers than they did last year. These two sums, taken together, gave a total advantage for the consumer of £2867. Their financial year was ended; and they expected to be able to give a further reduction in the price of gas of 2½d.—making it 3s. 4d. instead of 3s. 6½d. per 1000 cubic feet. If the public went in for the heating of their living-rooms and bedrooms by gas, and used as much gas for cooking as last year, they would be able to still further reduce the price. An increase of 5 million cubic feet in the consumption would give another reduction of 2½d.

A foreshadowing paragraph regarding gas affairs in Broughty Ferry was published in the "Dundee Courier" last Saturday, which stated: "Now that the 15th of May is past and the financial year closed, surmises are rife as to how all the accounts actually stand. That there will be a big deficit (in the gas accounts) is regarded as a certainty; and it is also confidently predicted that the Commissioners will be under the necessity of again increasing the price. The electric light is now a competitor with gas to such an extent as to materially affect the consumption of the latter. From a change contemplated at the works, it is evident that the Commissioners are not bent upon fostering the sale of gas-cookers, &c. The new departure indicated has reference to the show-room for cookers and gas-fires, which, we understand, is to be discarded, and used for official purposes." The paragraph is not a very sensibly constructed one, and perhaps the writer may be altogether wide of the mark in some of his surmises.

The Kingskettle Gaslight Company have paid a dividend for the past year at the rate of 5 per cent., and have reduced the price of gas from 5s. 5d. to 5s. per 1000 cubic feet.

In the Court of Session on Tuesday, Lord Low closed the record in an action which has been brought by David Hill, riveter, residing at No. 74, Reid Street, Bridgeton, Glasgow, against the Barrowfield Iron-Works, Limited, of Glasgow. The pursuer was working for the defenders in the erection of a gasholder in the Corporation gas-works at Dumfries, when he was injured, on the 24th of August, 1903, by the fall of a girder. Another workman was killed in the same accident. It is stated that one of the ropes by which the girder was being raised broke; and it is maintained that it was defective. In defence, it is denied that any of the plant was defective, or that there was fault on the part of the contractors.

Gas v. Electricity for Street Lighting at Cardiff.—The Cardiff Electric Lightiug Committee recently held a special meeting for the purpose of considering the question of improving the illumination of streets not lighted by electricity. Mr. C. H. Bird said he was in favour of trying the Lucas incandescent system as an experiment; contending that the cost would be less than if they utilized electricity. He pointed out that the Gas Company offered to illuminate one street with Lucas lamps which would give the same candle power as arc lamps, for £39 per annum; whereas electricity would cost £70. Alderman Ramsdale, on the other hand, submitted that where the Corporation had a business of their own, use should be made of it. In the course of further discussion, it transpired that for certain 150-candle power gas-lamps in the town the Committee were paying £11 10s. per lamp per annum; but the Gas Company now offered to supply Lucas incandescent lamps of 750-candle power for £6 12s. each. Eventually, it was decided to make an experiment with the Lucas system on six lamps in different parts of the town.

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HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
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		ACCRINGTON	500,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 28.

Sulphate of Ammonia.

The market has been extremely quiet throughout the week, and the tendency is still in buyers' favour, although the quotation is at the close nominally £11 17s. 6d. per ton f.o.b. at the ports. Owing to holidays, there has been less pressure to sell; but, on the other hand, requirements have been small and mainly for the Colonies. The Continent remains indifferent, and Spanish buyers, being in no hurry, are only interested at a discount on current prices. The forward position remains in the hands of speculators, who are offering abroad ordinary quality at the equivalent of £11 12s. 6d. per ton and 25 per cent. at the equivalent of £11 15s. per ton f.o.b. for delivery over the autumn months.

Nitrate of Soda.

Owing to arrivals local prices have been dropped to 10s. per cwt. for ordinary and 10s. 4½d. for refined quality.

LONDON, *May* 28.

Tar Products.

The market for tar products continues very quiet; and there is little business to report, partly owing, no doubt, to the holidays. Pitch still remains very quiet. A little business is reported to have been done in London at 33s.; but the market price is about 32s. 6d. Neither the Continental nor South Wales consumers appear to be at all anxious to contract for either prompt or forward. In the former case, they appear to be well stocked; while the latter seem to believe in lower prices later on. It is reported that the Scotch makers are pressing to obtain offers for their make in the South Wales market. Creosote is better. London makers report having realized 1¾d. per gallon, and some of the gas companies now ask 1⅞d.; while in the North a large business has been done at 1⅞d., and makers now ask 1 7/16d. to 1½d. Anthracene remains quiet. Small sales of good testing "A" quality are reported at from 1¾d. to 1⅞d. per unit, according to quality; and makers do not appear to be inclined to sell forward at existing prices. There are no sales whatever to report in "B" qualities; and prices are purely nominal. The demand for crude carbolic continues about the same, and business is reported in sixties at a slight advance on 2s. up to the end of the year; while makers now generally ask 2s. 1d. Crystals are firm; but there does not appear to be much business doing. Makers are not anxious to sell, apparently believing in better prices later on. A fair quantity of 90 per cent. benzol is reported to have been sold f.o.b. London at 9d. per gallon; and makers now ask 9¼d. to 9½d., at which price, however, it is impossible to find buyers. 50-90 per cent. is still neglected. There is very little business doing in solvent. A small quantity of good quality was sold at 9d. free to station, London. In toluol, there is no business whatever to report. Pyridine is firm. Makers still ask 6s. 6d., and one is reported to have declined 6s. 4½d.

The average values during the week were: Tar, 17s. 6d. to 22s. 6d. Pitch, London, 32s. 6d.; east coast, 32s.; west coast, 30s 6d. to 31s. Benzol, 90 per cent., 9d. to 9¼d.; 50-90 per cent., 7d. Toluol, 6½d. Crude naphtha, 3d.; solvent naphtha, 6½d. to 8d.; heavy naphtha, 10d. to 10½d. Creosote, London, 1½d. to 1⅝d.; North, 1⅜d. Heavy oils, 2⅛d. to 2¼d. Carbolic acid, 60 per cent., 2s. Refined naphthalene, £5 to £8; salts, 22s. 6d. to 25s. Anthracene, "A" quality, 1¾d. to 2d.; "B" quality, 1d., nominal.

Sulphate of Ammonia.

The market is quiet; and there is very little business doing. Beckton quote £12; but business is reported in London at £11 15s. There is no business doing at Hull; and the market is nominally £11 15s. to £11 17s. 6d. Business is stated to have been done in Liverpool at £11 15s.; and the value may be taken as £11 15s. to £11 17s. 6d. per ton. Leith is very quiet. A small sale is reported at £11 15s.; and the market value is probably from £11 15s. to £11 17s. 6d.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The past week has been so entirely a holiday in the coal trade of this district—the pits in the Manchester district closing last Tuesday evening until this morning, and the stoppages in other districts extending over varying but somewhat similar periods—that little or nothing can be reported from the actual trade point of view. Just prior to the holidays, extra buying, in anticipation of the pit stoppages, kept collieries on full time and cleared away any surplus lying under load on the railway sidings. Temporarily there was, as a consequence, some slight steadying in prices; while collieries will re-start with a comparative absence of what may be termed floating stocks, which are a weakness to the market. It cannot be said, however, that the actual position has undergone any real improvement; and it is certain that the resumption of work at the pits will speedily bring about an abundance of coal on the market, and that the accumulation of heavy stocks will only be checked by a general resort to short time, which it is the policy of the Lancashire coalowners to adopt on an extensive scale all through the summer. For the present, prices remain nominally without quotable change; but indications point to the more than probable return to keen competition, and consequent cutting to effect sales.

Northern Coal Trade.

The demand for coal has been naturally steadier after the holidays, which usually deplete stocks. There is now, however, a normal supply, and prices are easier than they were a week or so ago. Best Northumbrian steam coals are quiet at 10s. 6d. per ton f.o.b., second-class steams are perhaps more plentiful relatively, and are quoted from

THE
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PREVENTS NAPHTHALENE DEPOSITS.
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Among the Companies and Towns supplied are The Gaslight and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Oldham, Dundee, Perth, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past Ten Years.
MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.
THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.
The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.
Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.
For Prices and full Particulars, apply to
THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,
18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

8s. 9d. to 9s., and steam smalls are irregular at from 4s. 6d. to 4s. 10½d. In the gas coal trade, there is now an ample supply, except perhaps of the very best kind. Shipments to home users are less; but liberal quantities are being sent to some of the foreign consumers who take in stock during the summer season. Durham gas coals vary in price from about 7s. 9d. to 8s. 3d. per ton f.o.b., according to quality. The limited output of gas coke keeps the price firm at about 13s. 6d. per ton f.o.b. at the chief ports of shipment.

Scotch Coal Trade.

There is a quiet market, with prices, if anyway altered, a little easier. This is attributed to the accumulations which have been taking place at collieries. The prices quoted are: Main 7s. 3d. to 7s. 6d. per ton f.o.b. Glasgow, ell 8s. to 9s. 6d., and splint 8s. 6d. to 8s. 9d. The shipments for the week amounted to 232,322 tons—an increase of 12,101 tons upon the preceding week, but a decrease of 9839 tons upon the corresponding week of last year. For the year to date, the total shipments have been 4,078,578 tons—an increase of 112,808 tons upon the corresponding period of 1903.

Increased Gas Profits at Bury.—The profit on the Bury Corporation Gas-Works for the past year amounts to £8484, as compared with £5640 for the previous year. In accordance with their Act, the Gas Committee have decided to hand over one-half of the money to the relief of the general rate, and to return the other half to the consumers as their share of the profits. The nominal price of gas is to be left as at present—namely, 2s. 2d. per 1000 cubic feet—with the exception that persons using prepayment meters will receive 32 cubic feet for 1d., instead of 30 feet. Threepence per 1000 cubic feet consumed will be allowed in reduction of the price of gas on the amounts standing to the credit of consumers; the present amount allowed in this way being 2d. per 1000 feet. In addition, 1d. per 1000 feet is allowed for prompt payment, so that the price of gas this year will be equal to 1s. 10d. per 1000 cubic feet.

Cornish Gas Directors' Trip.—A few days ago, the Directors of the Penzance, Redruth, Hayle, and Camborne Gas Companies paid a special visit to Exeter, to inspect the works of Messrs. Willey and Co., Limited. The party numbered about twenty. On arriving at St. David's Station, they were met by Mr. Simpson and Mr. Glanfield, representing the firm, and proceeded in carriages to the Guildhall, where they were received by the Mayor (Mr. F. J. Widgery) and the ex-Mayor (Alderman Rowe). From the Guildhall the party proceeded to the Cathedral; and subsequently Messrs. Willey's engineering works at St. Thomas, and the meter works in James Street, were inspected—the visitors expressing themselves much pleased at what they had seen. At four o'clock, the party proceeded to the London Hotel, where they were entertained at dinner by Mr. Willey, who presided. After dinner, "Success to the Firm of Messrs. Willey" was enthusiastically honoured and duly responded to.

Portsmouth Water Company.—At the half-yearly meeting of this Company on the 26th inst., under the presidency of Mr. W. Grant, J.P., the report of the Directors, the principal portions of which were given in the "JOURNAL" last week, was unanimously adopted. In the course of his remarks, the Chairman referred to the negotiations which had been going on with the Gosport Water Company, and said the Directors were not sorry that they had been terminated by the Gosport Company themselves, as Portsmouth had nothing to gain from the proposed supply. Power was conferred on the Directors to exercise the borrowing powers of the Company.

Increased Storage for Conway.—At a Local Government Board inquiry held at Conway, with reference to an application of the Corporation for power to borrow £4000 for the construction of a new gasholder, the Borough Engineer (Mr. F. A. Delamotte) said the necessity of providing greater storage capacity had been apparent for some years; that at present available amounting to only about half-a-day's supply. The new holder is to be a three lift one; the outer lift being 54 feet in diameter and 22 feet deep, and the capacity 120,000 cubic feet. This will give a total storage of 180,000 cubic feet, or nearly two days' supply. During the past twelve months, the output has increased by 2,184,000 cubic feet—15,610,000 to 17,794,000 feet.

Reductions in Price.—Speaking at a gas exhibition last week, Mr. Robbie, the Convener of the Arbroath Gas Committee, said the financial year had now ended, and they would be able to give a reduction of 2½d. per 1000 cubic feet in the price of gas, bringing the rate down from 3s. 6½d. to 3s. 4d. The Directors of the Lewes Gas Company announce a reduction in price to ordinary consumers of 2d. per 1000 cubic feet, as from the Midsummer survey. There will be no reduction to prepayment consumers, as in their case the present price (which includes meter-rent) is said to be low in comparison with other towns; but the Directors propose to make a considerable reduction to them also from Midsummer in the charges for the hire of gas-fittings, cookers, fires, and all other apparatus for using gas by slot meters, except in cases where only a small quantity of gas is consumed.

Encouraging Incandescent Gas Lighting at Dartford.—In the article on "Electric Lighting at Dartford" which appears elsewhere, ample reason is furnished by a consumer for the lack of enthusiasm displayed by the inhabitants in regard to the adoption of the electric light. He points out that whereas the business methods of the Local Authority are arbitrary, those of the Gas Company are quite the reverse. Hence the favour shown to the illuminant they supply. As a good example of the Company's liberality, and of their desire to give satisfaction, we may mention that their Manager (Mr. F. W. Rapkin) has issued a circular announcing that the Directors have decided to appoint an inspector to attend periodically at consumers' premises (as from the 1st of July next) to clean, adjust, and put incandescent gas-burners into an efficient condition, free of charge; and they will also supply two new mantles per annum for each incandescent burner in use. When consumers' interests are studied in this way, they are not likely to resort to alight which is found to be unreliable.

BAND CONVEYORS

For RETORT-HOUSES, PURIFIER PLANTS, and COAL-STORES.

NEW CONVEYOR CO., LTD.,

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Gas Lighting at Hellifield.—A few days ago, the railway station at Hellifield was lighted by gas for the first time. From the holder at the gas-works, which are under the management of Mr. R. Wilson, 6-inch mains have been laid to the village, and connections are about to be made with various places.

Plumbers and their Grievances.—At a recent meeting of the Accrington District Gas and Water Board, a communication was read from the Accrington branch of the National Association of Master Plumbers, praying that the Board would discontinue the execution of internal plumbing work in houses. It was resolved that the request be complied with, and that such work be discontinued at the end of the present year or sooner, so that the plumbers employed by the Board for this purpose might be able to find situations with the local plumbers.

Dorking Gas and Water Supply.—Special meetings of the Dorking Gas and Water Companies have lately been held to sanction the raising of additional capital. The former Company were granted £4000, and the latter £5000. With regard to the larger amount, the Chairman of the Company (Mr. R. Barclay) explained that it was required to carry on the works, and to pay for those just completed. He thought the shareholders might congratulate themselves that these were a great success. The cost was £8000; and Sir John Aird and Sons had done their work excellently well. The Company had every prospect that the supply would last the town for a great many years, and that the demand for water would increase.

Staffordshire Potteries Water Company.—The report which was adopted at the annual meeting of the Staffordshire Potteries Water-Works Company last Wednesday stated that the revenue for the year amounted to £53,918, or an increase of £1681. The profit on revenue account was £27,486, which, with the balance of £395 brought forward from the last account, made a total of £28,382. After providing for the interim dividend paid in December, there remained a balance of £15,856, which the Directors recommended should be appropriated to the payment of a dividend of 9½ per cent. on the consolidated ordinary stock, making 9 per cent. for the year (£11,367), and at the rate of 7 per cent. per annum on the consolidated new ordinary stock, making 7 per cent. for the year (£2113), to be transferred for voids and abatements £150, and to be carried forward £1955.

Standardization of Water-Fittings.—We learn that a circular has been sent out by the Joint Committee on Water Regulations, stating that a Sub-Committee has been formed for the purpose of considering the standardization of water-fittings. The Committee held a preliminary meeting on the 22nd ult., when Mr. R. Askwith, Engineer to the Weardale and Consett Water Company, was elected Chairman, and it was decided to invite manufacturers of water-fittings to appoint representatives to act on the Committee. The circular goes on to state that there did not appear to exist any Association representing the manufacturers of water-fittings of Great Britain to whom the Committee could apply for the nomination of official representatives, and communications had therefore been forwarded to the leading firms making this class of work a speciality, suggesting that a meeting of the principal manufacturers of water-fittings should be held in London at an early date. It is proposed to hold such a meeting at the Guildhall, when Mr. Askwith will explain the nature of the work to be undertaken and the suggested representation of the manufacturers on the Committee. It will then be left to those present to discuss the matter among themselves in private and to nominate some of their number to represent them officially.

Maintenance of Incandescent Burners by Ironmongers.—With reference to the article in the "JOURNAL" for the 10th inst. (p. 367) describing the arrangements made by the Hornsey Gas Company with local firms for pushing the gas-stove and incandescent burner business, one of the firms (Messrs. J. G. Dunn and Son), in the course of a letter to the "Ironmonger" on the subject, say, in regard to the latter branch of the scheme, that the larger contracts pay for the most part very well; but even in these a contractor will occasionally fall on rocks. They cite the following as an instance: "We agreed with a customer to keep in order his 18 burners at our old price of 9d. per burner per quarter. We thus earn 13s. 6d. (By our united agreement these would now be charged—ten inside at 1s.; eight outside at 1s. 3d. each.) Eight of these are on outside lamps hung on to a fixed rail, and there are no cup-and-ball joints to any of these. In actual experience, this job for the quarter just ended worked out as follows: Forty-five mantles at 6d., 22s. 6d.; eight rods (say) 3d.; thirteen chimneys and protection-glasses, 4s. 4d.; man's time, 12½ hours, 12s. 6d.—total, 39s. 6d. This is, of course, quite an isolated case; but our experience proves that to be honest to yourself and to your customers no less price can be charged than we have named."

Destruction of Bacteria in Water.—The sulphate of copper cure for excessive numbers of bacteria in a reservoir is recommended by Dr. George T. Moore, of the United States Department of Agriculture. For a number of years he has been investigating the growth of algæ in water, and experimenting with different chemicals to discover some means of preventing the growth of this low form of plant life. Free chlorine, sulphur dioxide, silver salts, magnesium sulphate, various oxylates, and other substances, were tried, only to be abandoned. Finally, copper sulphate was discovered to be best suited for the purpose; and it is claimed that by the use of as much of this salt as could be bought in America for 50 to 60 cents for every million gallons of water in a reservoir, all known types of algæ can be killed without affecting the potability of the water. It is also claimed that the typhoid bacillus is very sensitive to this solution, and that a few parts of the sulphate to 100,000 parts of water will effectually free it from typhoid and cholera germs in three or four hours. Our contemporary, the "Engineering Record," urges that, until the proposed remedy has been tried a number of times on a large scale, the managers of water-works will do well to place no reliance on its practical value. The condition of water in a deep reservoir makes it hardly possible to secure a uniform distribution of the sulphate through the contents of such a basin, even assuming that the chemical will have the effect on a large scale that the laboratory experiments indicate.

A

New

Cooker.

—

FURTHER

PARTICULARS WILL APPEAR

IN THE

'GAS JOURNAL."

JUNE 14TH.

—

Richmond's Ltd.

—

Stove-Works { WARRINGTON. STRATFORD.

Malta and Mediterranean Gas Company.—The report which will be presented at the annual meeting of this Company on the 14th prox., states that there was a satisfactory improvement in the working during the year ending March 31, which has resulted in an increased profit of £845. Considerable additions have been made to the works and mains at Malta. The balance of the general revenue account is £5633; and the Directors will be able to recommend the payment of the usual dividends on the first and second preference capital, and a dividend of 3 per cent. on the ordinary capital—making, with the interim dividend paid in December last, 5 per cent. for the year, and leaving a balance of £1552 to be carried forward. The Directors regret to announce the retirement from the Board, owing to ill-health, of Mr. Basil T. Makins. Mr. A. F. Phillips and Mr. A. W. Oke have been elected Directors of the Company.

Beccles Gas and Water Company.—The report of the Directors of the Beccles Gas and Water Company for the year ending March 31 (which was submitted at the annual meeting last week), showed a profit of £1140, and a total sum of £3941 available for distribution. The usual dividends of 10 and 8 per cent. (less income-tax) on the various classes of shares were recommended, which would absorb £1030, and leave a balance of £2911 to be carried forward. In moving the adoption of the report, the Chairman stated that notwithstanding the reduction in the price of gas of 4d. per 1000 cubic feet, which represented a loss to the Company of £250 per annum, the receipts from the sale of gas had increased £33; while the extra quantity sold during the year was nearly 1½ million cubic feet. The make per ton of coal carbonized had been increased by 550 cubic feet during Mr. William Methven's management. Mr. Methven gave a short account of the year's working, which showed that the profits would have been much higher but for extensive main-laying operations; while £300 had been spent on retorts, £105 on cookers, and the pumps, engine, and boilers had been renewed.

Messrs. Drakes, Limited, have secured orders from Hornsea, Sharpness, Millom, and Welshpool for the erection of their patent tube regenerator furnaces.

The tender of Messrs. D. Bruce Peebles and Co., Limited, for the supply of a governor for the gasholder station at Gallow Hill, Aberdeen, has been accepted.

The Southwark and Vauxhall Water Company, as will be seen by an announcement which appears in our advertisement columns, are inviting tenders for a further issue of 3 per cent. debenture stock.

While his chief has been in England on leave of absence since last September, Mr. W. W. Townsend has been in charge of the works and affairs of the Colombo (Ceylon) Gas Company; and the Directors have just shown their appreciation of his services by granting him an increase of salary of £160 per annum.

An exhibition of the gas appliances of Messrs. R. & A. Main, Limited, and John Wright and Eagle Range, Limited, was held in Cupar, Fife, last week. Miss Margaret Lovell was the lecturer and demonstrator. An exhibition of the gas appliances of Messrs. Fletcher, Russell, and Co., Limited, and of the Richmond Gas Stove and Meter Company, Limited, was held in Arbroath last week, with lectures and demonstrations by Mrs. J. G. Middleton.

We have received from the Temperley Transporter Company, of 72, Bishopsgate Street Within, E.C., their general catalogue for the present year. The Company are the sole proprietors of the British and Foreign patents relating to the Temperley machinery, the various forms of which are described and illustrated in the catalogue, which it is no exaggeration to say is a veritable work of art. One scarcely realizes the varied uses of transporter plant until the pages of the catalogue are turned over; but they are fully revealed by a perusal of the descriptive matter accompanying the well-executed illustrations. The book shows what can be done in the way of lifting and transporting materials mechanically.

There was recently held in the Corn Exchange, Wakefield, under the auspices of the Gas Company, an exhibition of gas cooking and other appliances. The former were supplied by Messrs. Wilsons and Mathiesons, Limited, and Messrs. Fletcher, Russell, and Co., Limited; while Messrs. W. Sugg and Co., Limited, and the Anti-Vibration Incandescent Lighting Company, Limited, had attractive stands at which were shown the most improved systems of lighting. Practical demonstrations in cooking were given by Miss Edith Sanderson and Miss A. C. Wilkinson. The whole of the arrangements were carried out by the Company's Engineer and Manager, Mr. H. Townsend; and the result was a most effective and instructive display.

The annual outing of the employees of the St. Austell Gas Company, arranged by the Manager (Mr. H. E. Riley), took place on Whit Monday; a trip being made to the Lizard. As the event signalized the completion of the new gasholder which Messrs. R. Dempster and Sons, Limited, of Elland, have erected for the Company, their foreman (Mr. J. A. Garside) and the men who had been engaged upon the work, joined the party, which included a few visitors. After dinner, Mr. Riley, who presided, proposed "The Contractors," coupling the toast with the name of Mr. Garside. In the course of his remarks, he stated that the work entrusted to his firm had been completed about two months within the contract time. Mr. Garside, in responding, paid a high tribute to the ability of Mr. Riley, who, he said, had treated him and his men with the utmost respect. He also spoke of the up-to-date character of the gas-works. Other toasts followed; one being "The Visitors," proposed by Mr. E. C. Riley, the Gas Engineer to the Great Western Railway Company, who stated that Messrs. Dempster and Sons were starting on the fourth contract for him at Swindon; and, from his experience of the firm, he was sure the St. Austell Company would find their new holder would give every satisfaction. Notwithstanding the unfavourable weather, the party thoroughly enjoyed their outing.

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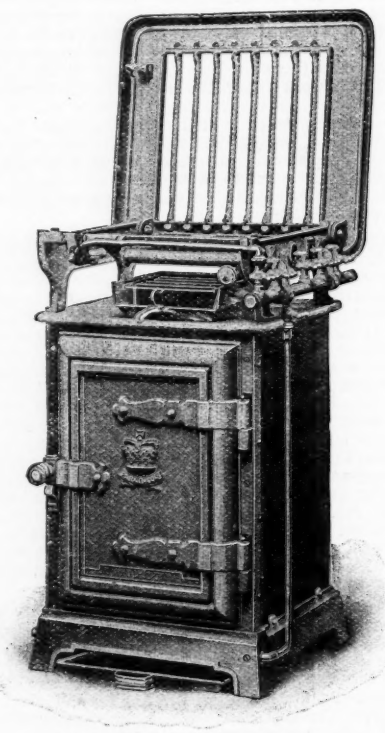

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WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

GENERAL ASSISTANT. Long Eaton Gas-Works.
REPRESENTATIVE. "Refractory," care of Streets, Cornhill.
BOOK-KEEPER. Waterford Gas-Works.
GENERAL FOREMAN. Sheffield Gas Company.
SHOW-ROOM ATTENDANT. Ebbw Vale Company. Applications by June 9.
MANAGER. Gosport Gas Company. Applications by June 15.
CLERK (Secretary's Office). No. 4216.
WASTE WATER INSPECTOR. No. 4218. Applications by June 9.

Situations Wanted.

ASSISTANT MANAGER. No. 4178.
MANAGER OR ASSISTANT, &c. No. 4214.
MAIN AND SERVICE LAYER, &c. No. 4217.

Plant, &c., for Sale.

COMPLETE GAS-WORKS. Toddington, Beds. June 6.
CONDENSER (250,000 feet). Redditch Gas-Works.
MOUTHPIECES, PIPES, AND FITTINGS, BENCH FITTINGS, &c, LANTERNS, VALVES, STEAM ENGINE, &c. Cambridge Gas Company.
PIPES (16-inch, new). No. 4215.

Plant, &c., Wanted.

TOWER SCRUBBER. No. 4203.

Meetings.

CHELSEA WATER COMPANY. Offices, June 16. One o'clock.
INSTITUTION OF GAS ENGINEERS. London. June 7, 8, and 9.
MALTA AND MEDITERRANEAN GAS COMPANY. London offices, June 14. Twelve o'clock.

Stocks and Shares for Sale.

BARKING GAS COMPANY. June 7.
BARKING GAS COMPANY. June 21.
BARNET GAS AND WATER COMPANY. June 7.
BRISTOL GAS COMPANY. June 16.
EAST SURREY WATER COMPANY. June 24.
HASTINGS AND ST. LEONARDS GAS COMPANY. June 7.
ILFORD GAS COMPANY. June 7.
REIGATE GAS COMPANY. June 24.
SOUTH ESSEX WATER COMPANY. June 7.
SOUTHEND WATER COMPANY. June 7.
SOUTHWARK AND VAUXHALL WATER COMPANY. June 10.

Stocks and Shares for Sale—*continued.*

TOTTENHAM AND EDMONTON GAS COMPANY. July 1.
WEST HAM GAS COMPANY. June 7.
WEST SURREY WATER COMPANY. June 7.
WEST SURREY WATER COMPANY. June 13.

TENDERS FOR

Benzol.

LEIGH CORPORATION. Tenders by June 11.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.
STRETFORD GAS COMPANY. Tenders by June 14.

Brass Main Cocks.

MIDDLETON GAS DEPARTMENT. Tenders by June 8.

Coal and Cannel.

BUXTON GAS DEPARTMENT. Tenders by June 13.
COALVILLE GAS DEPARTMENT. Tenders by June 14.
HAYWARDS HEATH GAS COMPANY. Tenders by June 2.
HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD. Tenders by June 8.
HEXHAM GAS COMPANY. Tenders by June 13.
HEYWOOD GAS DEPARTMENT. Tenders by June 14.
HINDLEY GAS DEPARTMENT. Tenders by June 20.
KNUTSFORD LIGHT AND WATER COMPANY. Tenders by June 1.
LANCASTER GAS DEPARTMENT. Tenders by June 15.
LEIGH CORPORATION. Tenders by June 11.
LLANDUDNO GAS DEPARTMENT. Tenders by June 4.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.
NOTTINGHAM GAS DEPARTMENT. Tenders by June 6.
OLDHAM GAS COMPANY. Tenders by June 14.
PAIGNTON GAS COMPANY. Tenders by June 11.
ROCHESTER, CHATHAM, AND STROOD GAS COMPANY. Tenders by June 8.
SALISBURY GAS COMPANY. Tenders by June 13.
SEDGLEY GAS DEPARTMENT. Tenders by June 9.
SHREWSBURY GAS COMPANY. Tenders by June 18.
SOUTHWARK AND VAUXHALL WATER COMPANY. Tenders by June 6.
STOKE-ON-TRENT GAS DEPARTMENT. Tenders by June 15.
STOURBRIDGE GAS DEPARTMENT. Tenders by June 14.
STRETFORD GAS COMPANY. Tenders by June 14.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 6.
TAUNTON GAS COMPANY. Tenders by June 10.
TYLDESLEY-WITH-SHAKERLEY GAS DEPARTMENT. Tenders by June 7.
WINSFORD GAS DEPARTMENT. Tenders by June 14.
WIRKSWORTH GAS COMPANY. Tenders by June 6.

Coke.

SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 6.

Lead and Lead Piping.

LEIGH CORPORATION. Tenders by June 11.
TYLDESLEY-WITH-SHAKERLEY GAS DEPARTMENT Tenders by June 7.

Lime.

LEIGH CORPORATION. Tenders by June 11.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 6.
TYLDESLEY-WITH-SHAKERLEY GAS DEPARTMENT. Tenders by June 7.

Meters.

MIDDLETON GAS DEPARTMENT. Tenders by June 8.

Oils and Lubricants.

MIDDLETON GAS DEPARTMENT. Tenders by June 8.

Pipes and Specials.

LEIGH CORPORATION. Tenders by June 11.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.
TYLDESLEY-WITH-SHAKERLEY GAS DEPARTMENT. Tenders by June 7.

Purifiers.

MASTERTON (N.Z.) GAS DEPARTMENT.

Retort Bench.

UCKFIELD GAS COMPANY. Tenders by June 7.

Sulphuric Acid.

LEIGH CORPORATION. Tenders by June 11.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.

Tar and Ammoniacal Liquor.

ABERDARE GAS COMPANY. Tenders by June 8.
BUXTON GAS DEPARTMENT. Tenders by June 13.
HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD. Tenders by June 8.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.
STOURBRIDGE GAS DEPARTMENT. Tenders by June 14.
STRETFORD GAS COMPANY. Tenders by June 14.
SUTTON-IN-ASHFIELD. Tenders by June 6.
WIRKSWORTH GAS COMPANY. Tenders by June 6.

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"VOLCANIC" FIRE CEMENT.
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HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

ATTERTON'S Patent Charging Machine, especially adapted for Small Works up to 50 Millions. Nearly 40 already supplied, and still supplying. Would soon repay for small outlay. Increased make and reduction in cost.
Apply to E. PADFIELD AND CO., 96 & 98, Leadenhall Street, LONDON, E.C.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd., (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

COAL GAS TAR wanted.
ROBINSON BROTHERS, LIMITED. Works: WEST BROMWICH, KNOTTINGLEY, and SPONDON.

PATENTS AND TRADE MARKS
PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

OXIDE OF IRON.
(NATURAL.)

BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.
BALE'S FIRE CEMENT, PAINT, AND GAS COAL
5, CROOKED LANE, LONDON, E.C.

COAL GAS TAR wanted.
BEST PRICES GIVEN.
SHARPNESS CHEMICAL COMPANY, LIMITED, Sharpness Docks, GLOS.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

SULPHATE OF AMMONIA
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

THE Company advertising for Superintendent of their Distribution Department under No. 4195, beg to THANK the numerous Applicants for the position, and inform them that the APPOINTMENT HAS BEEN MADE.

YOUNG Man, Age 24, seeks Situation in a Gas-Works. Used to Main and Service, &c. Willing to make himself useful.
Address No. 4217, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as Manager of small Works, or ASSISTANT or OUT-DOOR INSPECTOR of larger Works, at home or abroad.
Address No. 4214, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

APPOINTMENT wanted as Assistant- MANAGER in Gas-Works. Trained at Engineering Works. Recently prepared Drawings and Superintended erection of large up-to-date Gas-Works. Good knowledge of Chemistry and Gas-Works Routine. Honours Gas Manufacture.
Address No. 4178, care of Mr. King, 11, Bolt Court FLEET STREET, E.C.

WANTED, a Smart Young Fellow as GENERAL ASSISTANT. Must be fair Chemist and Draughtsman. Opportunity for all-round Experience with progressive Company.
Apply, by letter, to W. G. STEVENSON, Manager and Secretary, Gas-Works, LONG EATON.

REPRESENTATIVE wanted for the sale of Special Refractory Cement for Gas-Retorts and other Gas-Works purposes. Must have necessary Connection and be a pushing Salesman.
Apply, with full Particulars, References, Age, and Terms expected, to "REFRACTORY," care of Street's, CORNHILL, E.C.

WANTED, in an Office of a Secretary to a Gas Company not far distant from London, a CLERK competent to keep the Accounts under supervision.
Apply, stating Age, previous Experience, and Salary required, to No. 4216, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GOSPORT GAS AND COKE COMPANY.

MANAGER wanted for the above Works, making about 100 Million cubic feet per Annum. The Works include a Carburetted Water-Gas Plant.
House, with Rates, Coal, and Gas free.
Applications, stating Age, Experience, and Salary required, with *copies* only of recent Testimonials, to be sent to the SECRETARY on or before the 15th day of June, 1904.

WASTE INSPECTOR.

WANTED for a Water-Works supplying a population of about 14,000 a competent WASTE INSPECTOR, who must be a Registered Plumber and thoroughly familiar with, and able to repair, Deacon and Kennedy Meters.
Salary £2 2s. per week. Uniform provided.
Apply, by letter, stating Age and References, not later than June 9, to No. 4218, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SHEFFIELD UNITED GASLIGHT COMPANY.

GENERAL FOREMAN.

WANTED a General Foreman for the Grimesthorpe Gas-Works. Must be a man with a thorough knowledge of Gas Plant, and who has had a good Mechanical Training. Age 30 to 40. Wages £2 5s. per week, with House, Gas, and Coal.
Apply, by letter, giving Experience, and stating whether Married or Single, to Mr. JOHN W. MORRISON, Engineer, Gas Offices, Commercial Street, SHEFFIELD.
May 16, 1904.

WATERFORD GAS-WORKS.

BOOK-KEEPER wanted, competent to keep Rental and Residuals Ledger, at the Waterford Gas-Works. Not over 30 years of Age. Wages 35s. to 45s., according to Experience and Ability.
Apply, in own handwriting, with *copies* of Testimonials, stating Age, Experience, Family if married, and Salary expected, to the undersigned.
R. BRUCE ANDERSON,
Engineer and General Manager.
5, Westminster Chambers,
London, S.W.

THE EBBW VALE COMPANY LIMITED.
(GAS DEPARTMENT.)

SHOW-ROOM ATTENDANT.

WANTED, a Young Man to take charge of the above Company's Show-Room. Applicants must have had good Experience in pushing the Sale and Hire of Stoves and Fires. A practical knowledge of Incandescent Lighting and the Maintenance of Burners will be a recommendation.
Apply, by letter, to the Secretary, not later than June 9, 1904, stating Salary required and whether Married or Single.
W. D. JONES,
Engineer.
May 18, 1904.

WANTED, a Modern Tower Scrubber, 6 or 8-inch Connections, about 30 ft. by 5 ft., and may have Water Distributor. Good Second-Hand preferred.
Specification and Price, &c., to No. 4203, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

GASHOLDER, 40 ft. diameter by 14 ft. deep, in wrought Tank, with six Columns, trellis Girders, and Suspension Gear. In splendid condition. Nearly new.
New GASHOLDER, 40 ft. diameter by 12 ft. deep, with Steel Standards; also new STEEL TANK to contain same.
Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

16-INCH CAST-IRON PIPES.

A GAS Company in the neighbourhood of Manchester have FOR DISPOSAL 28 lengths of new 16-inch Cast-Iron Spigot and Socket GAS-PIPES, bought in excess of requirements. The Pipes are 12 feet long. Average weight, 13 cwt. each, all perfectly sound, and of best English make. Offers invited.
Address No. 4215, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

CONDENSER for Sale. In splendid Condition. Cheap. Capacity 250,000 Cubic Feet per Twenty-four hours.
Apply to A. E. LAYTON, Manager, Gas-Works, REDDITCH.

COMPAGNIE Anonyme Continentale pour la Fabrication des Compteurs a Gaz et autres Appareils, 8, Rue Petrelle, Paris. SHARES in the above Company offered FOR SALE.
Apply, by letter, to "COMPAGNIE," care of Leathwait and Simmons, 5, Birchin Lane, LONDON, E.C.

CAMBRIDGE UNIVERSITY AND TOWN GASLIGHT COMPANY

HAVE for Sale the following Second-hand PLANT:

100 18 in. by 14 in. ⊓ MOUTHPIECES, with 6-inch Sockets and Wrought-Iron Lids, Cross-Bars, and Screws.
98 ASCENSION-PIPES and BENDS, 6-inch to 5-inch.
98 DIP-PIPES, 4 and 5 inch.
10 9 feet Lengths of 20-inch diameter Cast-Iron HYDRAULIC MAIN.
49 feet of 18-inch diameter Wrought-Iron HYDRAULIC MAIN.
30 Wrought-Iron BUCKSTAYS, about 9 ft. 6 in. long.
280 feet of 2-inch diameter Wrought-Iron TIE-RODS, in 9 lengths, with Screwed Ends, Coupling Boxes, and Nuts.
180 feet of 1¾-inch diameter Wrought-Iron TIE-RODS, in 10 lengths, with Screwed Ends, Coupling Boxes, and Nuts.
1000 LANTERNS, suitable for Flat-Flame Burners.
100 Wrought-Iron CRADLES for same.
One 15 in. Donkin RACK-VALVE, Flanged.
Five 14 in. " " " "
Three 14 in. " " " Socket and Spigot.
Two 12 in. " " " Flanged.
One 10 in. " " " Socket and Spigot.
Four 8 in. " " " Flanged.
One Horizontal STEAM ENGINE, by Gwynne, 7 in. by 12 in. Cylinder, Disc Crank suitable for 25,000 feet Exhauster.
For further Particulars, apply to
G. W. AUCHTERLONIE,
Engineer and Manager.

THE Stretford Gas Company are pre-pared to receive TENDERS for the surplus Gas TAR and AMMONIACAL LIQUOR produced at their Works (together or separately) for a period of One, Two, or Three Years commencing July 1, 1904.
The Directors are prepared to make the contract on the Sliding-Scale basis or otherwise.
Tenders to be sent in, addressed to the Chairman, endorsed "Tender for Tar, &c.," on or before Tuesday, June 14, 1904.
Form of Tender may be obtained from the Secretary.
The Directors do not bind themselves to accept the highest or any Tender.
BENJAMIN HAYNES,
Secretary.
Stretford, May 20, 1904.

TENDERS FOR COAL, SLACK, AND BENZOL.

THE Directors of the Stretford Gas Company invite TENDERS for the supply of screened and unscreened GAS COALS, GAS NUTS, GAS SLACK, CANNEL NUTS, and BENZOL, to be delivered during the next One, Two, or Three Years, in Monthly quantities as may be required.
Sealed Tenders to be sent to the Chairman of the Company not later than Tuesday, June 14, 1904, endorsed "Tender for Coal or Benzol."
Form of Tender to be obtained from the Secretary, Gas-Works, Stretford.
The lowest or any Tender not necessarily accepted.
By order of the Board,
BENJAMIN HAYNES,
Secretary.
Stretford, May 20, 1904.

HEXHAM GAS COMPANY.

COAL CONTRACT.

THE Directors of the above Company are prepared to receive TENDERS for the supply of about 4500 Tons (or part thereof) of unscreened GAS COAL delivered at Hexham Station, or at the Company's Works, as required during the Year ending June 30, 1905.
Tenders, endorsed "Coal Contract," stating the name of the pit at which the Coal is raised, to be forwarded to the undersigned not later than Monday, June 13, 1904.
HERBERT LEES,
Engineer and Secretary.
Gas Offices, Hexham,
May 24, 1904.

THE Urban District Council of Hindley are prepared to receive TENDERS for the supply of GAS COAL, CANNEL, ENGINE SLACK, and LIME, required at their Gas-Works during the ensuing Twelve Months.
Full Particulars with Form of Tender can be obtained on application to Mr. H. O. Timmins, Gas and Water Manager.
Sealed Tenders, endorsed "Tender for Gas Coal, &c.," to be lodged with the undersigned not later than Monday, June 20, 1904.
By order,
THOMAS ROBEY,
Clerk to the Council.
Offices: Cross Street,
Hindley, May 24, 1904.

CORPORATION OF LANCASTER.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of GAS COAL and NUTS, to be delivered on the Gas-Works Siding, Lancaster, in such quantities and at such times as may be required during a period of Twelve Months commencing delivery July 1 next.
Sealed Tenders, endorsed "Gas Coal," giving full Particulars of the Coal offered, must be delivered to T. C. Hughes, Esq., Town Clerk, Lancaster, on or before Wednesday, June 15.
Any further Information and Forms of Tender may be obtained on application to the undersigned.
C. ARMITAGE,
Manager.
Gas-Works, Lancaster.

THE Corporation of Middleton are pre-pared to receive TENDERS for the supply of 5000 Tons of COAL and CANNEL, delivered at the Middleton Railway Station.
Further Particulars and Form of Tender may be obtained from Mr. E. E. J. Anderson, M.Inst.M.E., Gas Engineer.
All persons or firms tendering for this Coal or Cannel must pay their Workpeople the Standard or Trades Union rate of wages at least, and observe the Trade conditions which attach to the various kinds of work for which a Tender is sent in.
Tenders, addressed to the Chairman of the Gas, &c., Committee, and endorsed "Tender for Coal and Cannel," to be delivered at my Office not later than Wednesday, the 8th of June, 1904.
The Corporation do not bind themselves to accept the lowest or any Tender.
FREDERICK ENTWISTLE,
Town Clerk.
Town Hall, Middleton,
May 20, 1904.

THE Corporation of Middleton are pre-pared to receive TENDERS for SUNDRY STORES for the Year ending March 31, 1905, consisting of the following: LIME, VITRIOL, METERS, BRASS MAIN COCKS, TUBES and FITTINGS, OILS (Gas-Engine, Cylinder, Engine, Boiled, Exhauster, and Conveyor Lubricant), and BENZOL; and also for the purchase of the surplus TAR made at their Gas-Works during the same period (about 700 Tons).
Further Particulars, Specifications, and probable Quantities may be obtained on application to Mr. E. E. J. Anderson, M.Inst.M.E., Gas Engineer.
All persons or firms tendering for these Articles must pay their Workpeople the Standard or Trades Union rate of wages at least, and observe the Trade conditions which attach to the various kinds of work for which a Tender is sent in.
Tenders, addressed to the Chairman of the Gas, &c., Committee, endorsed "Tender for Sundry Stores," as the case may be, must be delivered at my Office on or before Wednesday, the 8th of June, 1904.
The Corporation do not bind themselves to accept the lowest or any Tender.
FREDERICK ENTWISTLE,
Town Clerk.
Town Hall, Middleton,
May 20, 1904.

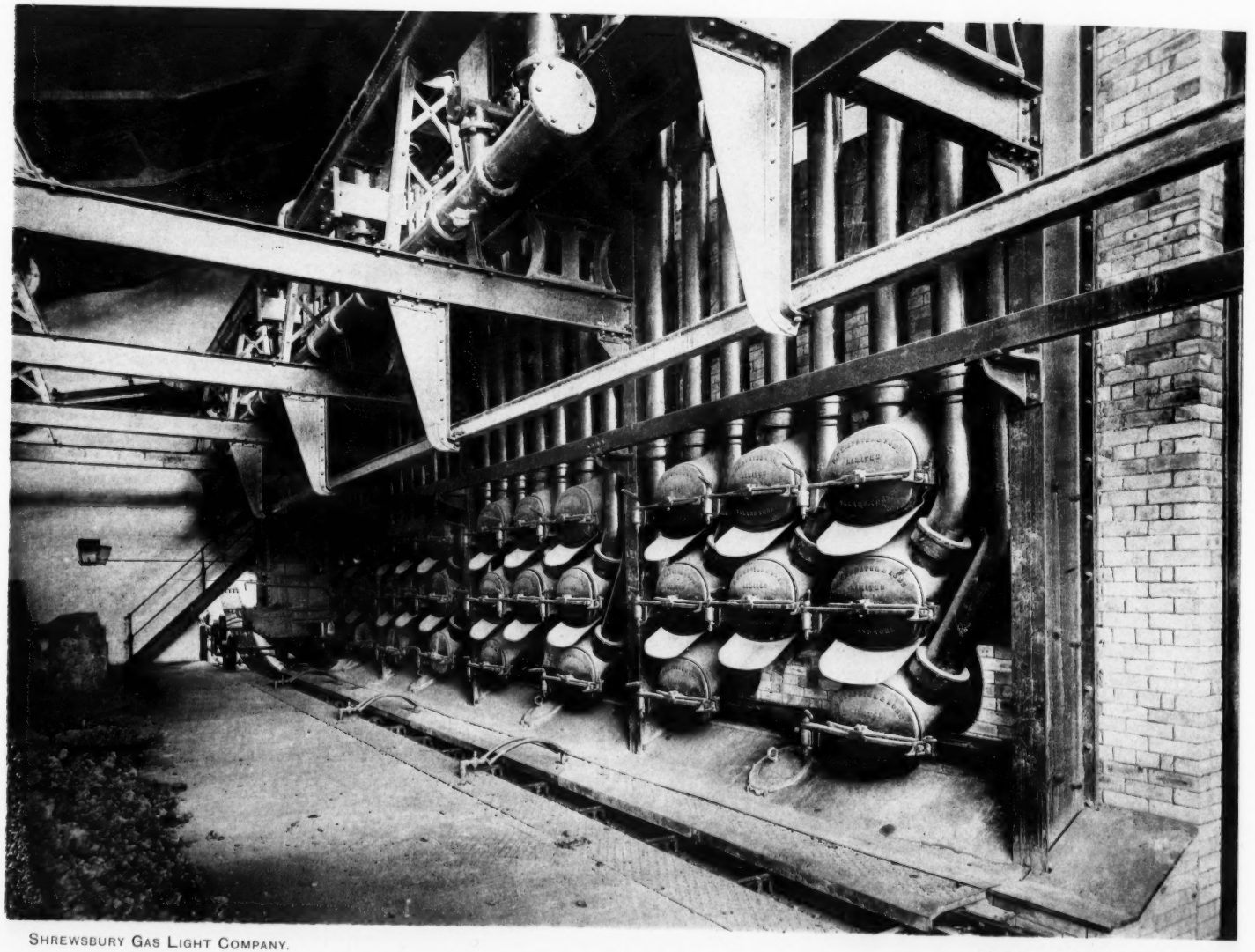
HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD.

THE above Board are prepared to receive TENDERS for the supply of COAL and CANNEL required at their Gas-Works, Hebden Bridge, during the Twelve Months ending July 31, 1905. The probable quantity will be about 7000 to 8000 Tons.
Also for the surplus TAR and LIQUOR made at their Gas-Works during the Six Months ending Dec. 31, 1904.
The Tar and Liquor will be loaded free in Contractor's Tanks on the Gas-Works Siding, Hebden Bridge Station (L. & Y. Railway).
Further Particulars regarding the above may be had on application to the Engineer and Manager, Mr. E. J. Wellens.
Forms of Tender, either for Coal or Tar and Liquor, on receipt of stamped addressed envelope.
Sealed Tenders, endorsed "Tar and Liquor" or "Coal," as the case may be, to be addressed to the Chairman of the Gas Board, Gas Offices, Hebden Bridge, not later than Wednesday, June 8, 1904.
R. CRABTREE,
Clerk to the Council and Gas Board.
Gas-Works, Hebden Bridge,
May 21, 1904.

HAYWARDS HEATH DISTRICT GAS COMPANY.

GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 3400 Tons (more or less) of GAS COAL, to be delivered in such quantities and at such periods as may be ordered between the 1st of July, 1904, and the 30th of June, 1905.
The Coal required is to be unscreened, and to be delivered, in Trucks, free at the Haywards Heath Railway Station (London, Brighton, and South Coast Railway) in good and dry condition, either from the South Yorkshire or Durham Coalfields.
Payments, net cash monthly.
Tenders are to state the name of the Pits from which the above description of Coal will be supplied; the same to be fresh wrought, and free from Slate or other objectionable matter for Gas Making, and to the entire satisfaction of the Company's Manager.
Each delivery to be accompanied by a certificate stating place of origin and Railway weight of each truck.
The Directors have no special Form of Tender, and do not bind themselves to accept the lowest or any Tender.
Tenders are to be received by me on or before Friday, the 3rd day of June next, and endorsed "Tender for Gas Coal."
(Signed) RUSSELL CORY,
Secretary.
85, Gresham Street,
London, E.C.



Shrewsbury Gas Light Company. W. Belton, A.M.I.C.E., Engineer.

DRAWING STAGE OF INCLINED RETORT INSTALLATION, SHOWING HOT COKE CONVEYOR,
MADE AND ERECTED IN 1903 BY

ROBERT DEMPSTER & SONS LTD., ELLAND, YORKS.

Printed for Walter King, by King, Sell & Olding, Ltd.; and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, May 31st, 1904.

Collotype by Waterlow & Sons Ltd.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of 12,500 Tons of COAL and 500 Tons of CANNEL.

Specification and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.

Sealed Tenders, endorsed "Coal," to be sent to me not later than Tuesday, June 14, 1904.

By order,
GEO. G. BOUCHIER,
Town Clerk.

Municipal Buildings,
Heywood, May 18, 1904.

THE Llandudno Urban District Council invite TENDERS for the supply of 7000 Tons of best screened GAS COAL, capable of producing a minimum of 10,000 cubic feet of 18-candle Gas per Ton, to be delivered, carriage paid, between the 1st of July next and the 30th of June, 1905, at the Llandudno Station of the London and North-Western Railway, in such quantities and at such periods as may be ordered from time to time.

Forms of Tender may be obtained on application to the undersigned, and only such Tenders as are upon the prescribed Form will be considered.

In every case where the Particulars asked for are not given, the Tenders will be thrown out and not considered.

Tenders must be sent to the undersigned not later than the 4th day of June next.

The Tender of any person or firm who personally, or through an agent, canvasses any of the officers or members of the Council will be rejected.

The Council do not bind themselves to accept the lowest or any Tender.

(signed) ALFRED CONOLLY,
Clerk to the Council.

May, 1904.

CORPORATION OF NOTTINGHAM.

(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Gas Committee are desirous to re- ceive OFFERS for supplies of COALS, COBBLES, or NUTS, for the period terminating June 30, 1905.

The large Coals and the Cobbles or Nuts are to be separately delivered, where and as from time to time directed, by, and at the expense of, the Contractors, upon the Gas-Works Siding, Great Northern Railway, in the Eastcroft at Nottingham, and also on the Gas-Works Sidings, Midland Railway, at Radford and Basford respectively; and at and after the rate of one-eighth part of such total quantity in each Calendar Month, commencing with the month of July next, till the Corporation shall be satisfied with the amount of accumulated Stock, and afterwards at such rate as shall be from time to time directed, till the agreed quantity shall have been delivered.

The Coals, Cobbles, or Nuts are to be the best of their respective kinds, freshly wrought and well screened (description, sizes, and inclination of screen to be specified), to be as free as possible from Sulphur, Bats, Bind, Refuse, and Dirt, and shall be weighed (20 cwt. to the ton) upon the Corporation machines, or upon such other machines as may be mutually agreed upon.

Payments will be made monthly, if and so long as the contract shall be duly fulfilled.

The Corporation do not bind themselves to accept the lowest or any Tender.

Further Information and Forms on which the Tenders must be made may be obtained on application to me, at the General Manager's Office; and the Tenders (sealed), specifying the description of Coals, the Seam, and the Pits at which they are to be raised, and stating the prices for deliveries at the several places and in manner and subject to the conditions aforesaid, must be delivered to Sir Samuel George Johnson, Kt., Town Clerk, by first post on Monday, the 6th day of June, 1904.

By order,
JAMES HERBERT BROWN,
Engineer and General Manager.

Corporation Gas Offices,
George Street, Nottingham,
May 26, 1904.

SUTTON-IN-ASHFIELD URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL, CANNEL, AND LIME.
TENDERS FOR COKE, TAR, AND AMMONIACAL LIQUOR.

COAL.

THE Gas Committee of the above Council are prepared to receive TENDERS for the supply of 1000 Tons of CANNEL and 5000 Tons of well-screened GAS COAL, to be free from Shale and Pyrites, and to be delivered at the Town Stations (Midland or Great Northern Railways), Sutton-in-Ashfield, in such quantities as the Manager shall from time to time direct between July 1, 1904, and June 30, 1905.

LIME.

Also for the supply of about 300 Tons of LIME, to be delivered at either of the above Railway Stations, in such quantities as the Manager shall from time to time direct between July 1, 1904, and June 30, 1905.

The Lime is to be hand-picked, and clear from Refuse and Ashes.

COKE, TAR, AND LIQUOR.

Tenders are invited for the COKE, surplus TAR, and AMMONIACAL LIQUOR produced at their Works from July 1, 1904, to June 30, 1905, to be delivered in Purchaser's Tank-Waggons at the Midland or Great Northern Railway Stations, Sutton-in-Ashfield.

Tenders for Coal to state price per Ton of 20 cwt. at the Works or above Railway Stations.

No Tender Forms provided.

The Committee do not bind themselves to accept the lowest or any Tender.

Tenders, endorsed, to be addressed as under so as to arrive not later than the 6th day of June, 1904.

By order,
JOHN D. FIDLER,
Clerk.

Council Offices, Sutton-in-Ashfield,
May 21, 1904.

THE

Institution OF Gas Engineers.

THE

ANNUAL GENERAL MEETING

WILL BE HELD ON

TUESDAY (10.30 a.m.),
WEDNESDAY (10 a.m.), and
THURSDAY (10 a.m.)

June 7th, 8th, and 9th,
AT THE

INSTITUTION OF MECHANICAL ENGINEERS,

STOREY'S GATE, ST. JAMES'S PARK, WESTMINSTER, S.W.,

By kind permission of the Council of that Institution.

THE CHAIR WILL BE TAKEN BY THE PRESIDENT,

HARRY E. JONES, Esq., M.Inst.C.E.

In connection with the Meeting, a Visit to Arundel has been arranged for Friday, 10th June. Full Particulars are announced in the Programme.

THE BENEVOLENT FUND.

The Annual General Meeting of the Contributors to the Benevolent Fund will be held on Wednesday, 8th June, at 10 a.m.

WALTER T. DUNN, Secretary.

39, *Victoria Street, Westminster.*

URBAN DISTRICT COUNCIL OF STOURBRIDGE.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the purchase of their surplus TAR during the Twelve Months ending June 30, 1905.

Tenders, endorsed "Tar," addressed to the Chairman of the Gas Committee, to be sent to me on or before Tuesday, June 14, 1904.

The highest or any Tender not necessarily accepted.

By order of the Committee,
WM. NORTH,
Engineer and Manager.

Gas-Works, Stourbridge,
May 24, 1904.

URBAN DISTRICT COUNCIL OF STOURBRIDGE.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply and delivery on to their Gas-Works of about 17,000 Tons of good screened GAS COAL or NUTS.

Forms of Tender may be had on application to the undersigned, and only Offers on these Forms will be considered.

Tenders, endorsed "Gas Coal," addressed to the Chairman of the Gas Committee, to be sent to me at the Gas-Works, Stourbridge, on or before Tuesday, June 14, 1904.

The lowest or any Tender not necessarily accepted.

By order of the Committee,
WM. NORTH,
Engineer and Manager.

Gas-Works, Stourbridge,
May 24, 1904.

UCKFIELD GAS COMPANY, LIMITED.

RETORT-BENCH.

THE Directors of the Uckfield Gas Company, Limited, are prepared to receive TENDERS for the erection of a RETORT-BENCH, consisting of Two beds of Six Retorts and One of Three, with Shallow Regenerative Settings, complete with all Ironwork.

Plans and Specification may be seen at the Gas Office, Uckfield, or at the Office of Mr. Andrew Dougal, M.Inst.C.E., Gas-Works, Tunbridge Wells, from whom any further Particulars can be obtained.

Sealed Tenders to be sent to the undersigned on or before Tuesday, June 7 next, endorsed "Tender for Retort-Bench."

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
CHARLES DAWSON, Secretary.

Town Hall Chambers, Uckfield,
Sussex, May 24, 1904.

TODDINGTON, BEDS.

TWO MILES FROM HARLINGTON STATION ON THE MAIN LINE.

TO INVESTORS, SPECULATORS, AND OTHERS.

THE Toddington Gas-Works, in full working order, consisting of the MANAGER'S HOUSE, RETORT and PURIFYING SHEDS, GAS-HOLDERS, &c., and BUILDINGS; also the MAINS and CONNECTIONS laid in and about the Town of Toddington, together with the LAMP-POSTS, to be SOLD BY AUCTION by

MESSRS. J. CUMBERLAND & SONS,

at the Council Chamber, Town Hall, Luton, on Monday, June 6, 1904, at Six o'clock in the Evening punctually.

May be viewed on application to the Manager at the Works, and Printed Particulars and Conditions of Sale may be obtained of Messrs. CHARLES A. BANNISTER and REYNOLDS, Solicitors, 70, Basinghall Street, LONDON, E.C., and of the AUCTIONEERS, LUTON, and at DUNSTABLE.

ROCHESTER, CHATHAM, AND STROOD GASLIGHT COMPANY.

SUPPLY OF GAS COAL.

THE Directors invite Tenders for the supply of about 45,000 Tons of GAS COAL, to be delivered between the 1st of July, 1904, and the 30th of June, 1905.

Further Particulars, with Form of Contract and Tender, may be had on application, and sealed Tenders, marked "Coal," are to be delivered to me at these Offices not later than noon on Wednesday, the 8th of June, 1904.

J. M. VEEVERS,
Engineer and Secretary.

Gas Offices, Rochester,
May 26, 1904.

TO COAL CONTRACTORS AND OTHERS.

THE Sedgley Urban District Council invite TENDERS for supplying 750 to 1000 Tons of GAS COAL, the deliveries to be made at the Shut End Siding at such times and in such quantities as may be directed.

It is desirable that a statement of an Analysis of the quality of a sample of the Coal to be supplied be sent with the Tender.

Sealed Tenders, marked "Coal," must reach me on or before the 9th of June, 1904.

The Council do not bind themselves to accept the lowest or any Tender.

By order of the Board,
JOSEPH SMITH,
Clerk to the Council.

Offices: High Holborn,
Sedgley, May 21, 1904.

BUXTON URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for:—

GAS COAL AND CANNEL.

The supply of 7000 Tons of Best Screened GAS COAL and 3500 Tons of CANNEL to be delivered as required at the Gas-Works Siding, Midland Railway, Buxton, during the Twelve Months ending July 31, 1905, in accordance with the Specification and Conditions, which may be obtained from Mr. H. Barker, Gas Engineer, Town Hall, Buxton.

TAR AND AMMONIACAL LIQUOR.

The purchase of the Surplus TAR and the whole of the AMMONIACAL LIQUOR which is produced, and delivered into purchaser's Tank-Waggons at the above mentioned siding, during the Twelve Months ending June 30, 1905.

Forms of Tender may be obtained from the Gas Engineer.

Sealed Tenders, endorsed "Coal," "Cannel," "Tar," "Liquor," respectively, are to be delivered to the undersigned on or before Monday, June 13, 1904.

The Committee do not bind themselves to accept any Tender.

JOSIAH TAYLOR,
Clerk.

Town Hall, Buxton,
May 27, 1904.

TYLDESLEY-WITH-SHAKERLEY URBAN DISTRICT COUNCIL.

THIS Council invite Tenders for the supply at the Gas-Works, Tyldesley, from the 1st of July next to the 30th of June, 1905, of the undermentioned—

GAS COAL and CANNEL.
Cast-Iron SPIGOT and SOCKET PIPES (Gas and Water).
LEAD TUBING (Tinned) (Gas and Water).
PIG LEAD.
Best BUXTON LIME.

Tenders are also invited for the purchase of the surplus TAR and AMMONIACAL LIQUOR to be produced at the Gas-Works during the Year ending the 30th of June, 1905.

Further Particulars and Forms of Tender may be obtained on application to Mr. Ginman, Engineer, Gas-Works, Tyldesley.

Sealed Tenders, on authorized Forms only, endorsed "Tender for ———," to be delivered at my Office not later than Tuesday, the 7th day of June, 1904.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
WM. J. MATTHEWS,
Clerk to the Council.

Council Offices: Tyldesley,
Manchester, May 25, 1904.

URBAN DISTRICT COUNCIL OF WINSFORD.

THE above Council are prepared to re- ceive TENDERS for the supply of CANNEL and best screened GAS COAL, to be delivered at the Cheshire Lines Station, Winsford, or the Over and Wharton Station of the L. & N.W. Railway, or at the Council's Wharf on the River Weaver, at Winsford.

The Material is required for a Term of Twelve Months, ending the 1st of August, 1905. The probable quantities required will be about 300 Tons of Cannel and about 1400 Tons of Gas Coal, which must be Freshly Wrought, Well Screened, and free from Sulphurous Pyrites and other objectionable Matter; but the Council reserve the right of reasonably increasing or decreasing quantities named.

The person whose Tender is accepted will be required to enter into an agreement with the Council for the due performance of the Contract.

Sealed Tenders, stating price per ton, delivered as above, are to be received by the undersigned on or before the 14th of June, 1904, and endorsed "Gas Coal Tender."

The Council do not bind themselves to accept the lowest or any Tender.

Forms of Tender and further Particulars may be had on application to the Gas Manager, F. Sidwell, Winsford, or from

JNO. H. COOKE,
Clerk to the Council.

Council Offices: Russell Street,
Winsford, Che hire,
May 27, 1904.

MASTERTON (N.Z.) CORPORATION GAS-WORKS.

TENDERS are invited for Two New PURIFIERS 10 or 12 feet square by 4 or 5 feet deep, without Grids, with 8-inch Connections and Single Valves to each Inlet and Outlet.

Apply, giving full Particulars and stating Price either c.i.f. Wellington (N.Z.) or f.o.b. London, to

DOUGLAS DOBSON, Assoc.M.Inst.C.E.,
Manager.

COALVILLE URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE above Council invite Tenders for the supply of 1600 Tons of GAS COAL and Washed NUTS, delivered in Waggons to Coalville (Midland Railway) between July 1, 1904, and June 30, 1905, in such quantities monthly as required.

The Council reserve the right to divide the quantities.

The lowest of any Tender not necessarily accepted.

Tenders, endorsed "Coal Tender," addressed to the Chairman of Gas Committee, Gas Offices, Whitwick, Leicestershire, on or before June 14, 1904, to be on Contractors own form.

JOS. W. EAGLES,
Engineer and Manager.

Gas-Works, Whitwick,
May 19, 1904.

SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gas- light Company, invite TENDERS for the supply of about 18,000 Tons of Screened GAS COALS, Washed NUTS, or Washed BEANS, and about 500 Tons of good English CANNEL, to be delivered free at the Great Western or London and North-Western Goods Yard, Shrewsbury, during the Year commencing July 1, 1904, and ending June 30, 1905.

The Directors reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Tenders must be made on forms (containing further Particulars) which may be obtained on application at the Company's Works, or by post, and must be sent to the undersigned, on or before the 18th day of June, 1904.

By order,
WM. BELTON, Assoc.M.Inst.C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
May 20, 1904.

PAIGNTON GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Paignton Gas Company are prepared to receive TENDERS for the supply of 3800 Tons (or such other quantity as may be agreed on) of best approved GAS COALS, to be delivered in such monthly quantities as may be required by the Company.

Tenders to state the price of the Coal delivered at Paignton Station (Great Western Railway) free of all charges.

The Directors do not bind themselves to accept the lowest or any Tender.

Further Particulars may be obtained on application to Mr. C. G. Dawson, the Company's Manager.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of Coal, to be sent on or before the 11th of June, addressed to the undersigned, at the Gas Offices, 1a, Victoria Street, Paignton.

F. W. PUDDICOMBE,
Secretary.

Paignton, May 12, 1904.

SOUTHWARK AND VAUXHALL WATER COMPANY.

TO COAL MERCHANTS.

THE Directors invite Tenders for the supply at their several Stations of about 19,000 Tons (more or less) of COAL during the Years 1904-5.

Specification and Form of Tender may be obtained at the Office of the Engineer upon payment of 10s. 6d., which amount will be refunded on receipt of a *bonâ-fide* Tender.

The latter must be sent in not later than the 6th of June next, addressed to the Chairman, Southwark and Vauxhall Water Company, Southwark Bridge Road, London, S.E., endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any Tender.

J. W. RESTLER,
Engineer.

Southwark and Vauxhall Water Company,
Southwark Bridge Road, May 18, 1904.

BOROUGH OF LEIGH.

(GAS AND WATER DEPARTMENTS.)

THE Gas and Water Committee of the above Corporation are prepared to receive TENDERS for the supply of the following goods:—

(1) 14,000 Tons of screened Arley GAS COAL, and NUTS.
(2) LEAD PIPE.
(3) VITRIOL.
(4) LIME.
(5) BENZOL.
(6) 2-inch and 3-inch Cast-Iron PIPES.

Forms of Tender may be obtained on application from the undersigned, to whom all inquiries must be addressed.

Sealed and endorsed Tenders must be delivered to Mr. Peregrine Thomas, Town Clerk, Town Hall, Leigh, Lancashire, on or before Twelve o'clock noon on Saturday, the 11th day of June next.

The Corporation do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide any Tender.

JAMES GIBSON,
Engineer and Manager.

Gas and Water Offices,
Leigh, May 28, 1904.

TAR Contracts Wanted on the Sliding- Scale or at Fixed Prices.

Managers and Secretaries desirous of selling to best advantage please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

TAUNTON GASLIGHT AND COKE COMPANY.

THE Directors are prepared to receive TENDERS for the supply of COAL over One or Two Years.

Particulars may be had from the Secretary.

Tenders, addressed to the Chairman, and endorsed "Tenders for Coal," to be delivered by the 10th of June.

A. EDWARDS,
Secretary and Manager.

THE Directors of the Knutsford Light and Water Company invite TENDERS for the supply of 2300 Tons of the Best GAS COAL (screened), and 300 Tons of the Best GAS CANNEL, to be delivered during the Year ending May 31, 1905, at Knutsford Station.

Tenders to be sent in to the Chairman of the Company, Knutsford, not later than the 1st of June.

The Company do not bind themselves to accept the lowest or any Tender.

COUNTY BOROUGH OF OLDHAM.

THE Oldham Corporation Gas-Works Committee are prepared to receive TENDERS for the supply of about 100,000 Tons of COAL required by them during the Year ending the 30th of June, 1905.

Specifications and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent on or before Tuesday, the 14th of June, 1904.

J. H. HALLSWORTH,
Town Clerk.

Oldham, May 24, 1904.

TENDERS FOR GAS COAL.

THE Corporation Gas Committee of Stoke-upon-Trent invite TENDERS for the supply of 14,000 Tons of GAS COAL.

Specification and Form of Tender may be obtained on application to the undersigned, or at the Gas Offices.

Tenders to be sent in not later than Twelve o'clock noon on the 15th day of June, 1904, addressed to F. Geen, Esq., J.P., Chairman of the Gas Committee, Stoke-upon-Trent, and endorsed "Tender for Gas Coal."

WM. PRINCE,
Engineer and Manager.

Gas Offices, Stoke-upon-Trent,
May 16, 1904.

THE Aberdare Gas Company invite TENDERS for the purchase of their surplus production of TAR and AMMONIACAL LIQUOR, or for either separately, for the Year ending June 30, 1905. Coal Carbonized, 6000 Tons, more or less.

Sealed Tenders, endorsed "Tar" or "Liquor," to be addressed to the Chairman not later than the 8th of June, 1904.

The lowest or any Tender not necessarily accepted.

EVAN JONES,
Manager and Secretary.

Gas Offices, Aberdare,
May 21, 1904.

WIRKSWORTH GASLIGHT AND COKE COMPANY, LIMITED.

TENDERS FOR GAS COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of about 800 Tons of GAS COAL, to be delivered at the Midland Railway Station, Wirksworth, in such quantities as the Manager shall from time to time direct.

Also for the purchase of the surplus TAR and LIQUOR made at their Works during the Twelve Months commencing the 1st day of July next.

The Coal must be freshly wrought and free from Sulphurous Pyrites and other Objectionable Matter.

Sealed Tenders, endorsed "Coal," to be delivered to the undersigned not later than June 6, 1904.

S HALSTEAD,
Secretary and Manager.

Gas Offices, Derby Road,
Wirksworth, May 21, 1904.

WEST SURREY WATER COMPANY.

ISSUE OF ADDITIONAL CAPITAL.

THE Directors of the West Surrey Water Company offer for SALE BY TENDER 800 ORDINARY SHARES of the nominal value of £10 each (Maximum Dividend 7 per cent. per annum), in Lots of 5 or more Shares.

Minimum Price, £15 per Share.

Last day for receipt of Tenders; 13th of June, 1904.

Forms of Tenders, and Particulars and Conditions of Sale, may be obtained from the Secretary, at the Offices of the Company, No. 38, Parliament Street, Westminster, S.W.

By order of the Directors,
WALTER COLBROOK,
Secretary.

May, 1904.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate to Debenture Stock and Bonds, WILL BE CLOSED at Four o'clock p.m. on Friday, the 10th prox., for the Half Year ending on the 30th prox., and will be RE-OPENED on the morning of Saturday, the 11th prox.

The Interest for the Half Year will be payable, on the 1st of July next, to the Proprietors registered on the closing of the Books.

By order,
HENRY RAYNER,
Secretary.

Chief Office: Horseferry Road,
Westminster, S.W., May 28, 1904.

SALISBURY GASLIGHT AND COKE COMPANY.

TENDERS are invited for 1000 to 4000 Tons of GAS COAL, delivered f.o.r. Salisbury, as required over the ensuing Twelve Months.

Monthly Payments, 1¼ per cent.

Tenders to be sent, on or before the 13th of June, to N. H. HUMPHRYS, Gas-Works, SALISBURY.

CHELSEA WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the Half- YEARLY GENERAL MEETING of the Governor and Company of Chelsea Water-Works will be held at their Office, Commercial Road, Pimlico, in the County of London, on Thursday, the 16th day of June prox., at One o'clock in the afternoon precisely, for the General Business of the Company, and also for the purpose of considering, and, if thought fit, passing, a Resolution, empowering the Directors to enter into an Agreement on behalf of the Company with the Metropolitan Water Board for the discharge, either wholly or partly, in Water Stock of the Compensation awarded to the Company for the transfer of their Undertaking.

The REGISTER OF TRANSFERS WILL BE CLOSED between the 4th day of June prox. and the 16th day of June prox., both days inclusive.

By order,
G. H. GILL,
Secretary.

Office: 41, Commercial Road,
Pimlico, May 30, 1904.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

TO THE SHAREHOLDERS.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Offices, 60, Gracechurch Street, London, E.C., on Tuesday, the 14th of June, 1904, at Twelve o'clock Noon, for the purpose of receiving the Report of the Directors and the Accounts for the Year ended the 31st of March, 1904, and for the transaction of the General Business of the Company.

One of the Directors, Col. James Le Geyt Daniell, retires from office, and offers himself for re-election.

The Auditors, Mr. Robert Hesketh Jones and Mr. Thomas Guyatt, retire, and offer themselves for re-election.

The TRANSFER BOOKS WILL BE CLOSED from the 31st of May until the day of the Meeting, both days inclusive.

By order of the Board,
A. W. COOPER,
Secretary.

60, Gracechurch Street, E.C.,
May 20, 1904.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

SALE BY TENDER OF £10,000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MINIMUM PRICE, £103 PER CENT.

IN pursuance of the Tottenham and Edmonton Gas Act, 1898, Notice is Hereby Given, that it is the intention of the Directors of this Company, to SELL BY TENDER £10,000 of the above Debenture Stock, to be paid up in full on or before the 14th of July next, such Stock being a portion of Additional Capital authorized to be raised by resolution passed at an Extraordinary General Meeting of the Proprietors held on the 24th day of February, 1900, under the Powers of the above-mentioned Act.

Particulars and Conditions, with Form of Tender, may be obtained on application at this Office, and sealed Tenders must be sent in not later than Four o'clock in the afternoon of Friday, the 1st of July, 1904.

By order of the Directors,
JAMES RANDALL,
Secretary.

Chief Offices: 639, High Road,
Tottenham, May 20, 1904.

SOUTHWARK AND VAUXHALL WATER COMPANY.

SALE BY TENDER OF THREE PER CENT. DEBENTURE STOCK.

NOTICE is Hereby Given, that it is the intention of the Directors of the Southwark and Vauxhall Water Company to SELL BY TENDER, to be received at the Company's Office, Southwark Bridge Road, S.E., not later than Twelve o'clock (noon) on Friday, June 10, 1904, £100,000 DEBENTURE STOCK of the Company.

The Stock now for Sale is part of the Capital authorized by, and to be issued under the provisions of, the Southwark and Vauxhall Water Act of 1898, and will be entitled from June 24, 1904, to Interest at the rate of £3 per cent. per annum. It will be known as Debenture Stock "B," and may be redeemed at par at the option of the Company any time after the expiration of Twenty-five Years from the date of issue, subject to six months' previous notice of the intention to redeem. Debenture Stock "B" will rank for interest *pari passu* with the other Debenture Stock of the Company, but before the Ordinary and Preference Stock and Share Capital.

On the transfer of the Water Companies to the Metropolitan Water Board, this Debenture Stock will have the advantage of the additional security provided by Section 15 of the Metropolis Water Act, 1902.

The Stock is a lawful investment for Trustees.

For Particulars, Forms, and Conditions of Tender, apply at the Office of the Company, Southwark Bridge Road, S.E.

By order of the Board of Directors,
MONTAGUE WATTS,
Secretary.

Southwark Bridge Road,
London, S.E., May 27, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

HASTINGS AND ST. LEONARDS GAS COMPANY.

SALE BY AUCTION OF £12,000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK

(Or such amount as will produce, including premiums, the sum of £12,158 8s. 9d.).

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, London, E.C., on Tuesday, June 7, at Two o'clock, by order of the Directors.

The Company was established in 1833, and supplies gas in Hastings and St. Leonards and adjacent districts. The total issued Capital is £475,000. Sales of Gas have risen from 325 million cubic feet in 1894 to upwards of 440 millions last year; there are nearly 10,500 consumers; upwards of 6700 gas-stoves are in use; and, after paying the Dividends to the 31st of December last, £46,479 was brought forward as Undivided Profit.

Purchases can be made either by the Secretary or Engineer of the Company or the Auctioneer, without charge, for investors unable to attend the Auction; and detailed Particulars with Form of Instructions to Purchase may be had at the Company's General Offices in Queen's Road, Hastings, or of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C

BARNET DISTRICT GAS AND WATER COMPANY.

£2500 "D" CAPITAL WATER STOCK,

Ranking for 7 per cent. Maximum Dividend, now receiving 5½ per cent.

TO BE SOLD BY AUCTION BY

MR. ALFRED RICHARDS, at the Mart, Tokenhouse Yard, E.C., on Tuesday, June 7, at Two o'clock.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £5000 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION at the Mart, E.C., on Tuesday, June 7, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

SOUTHEND WATER-WORKS COMPANY.

550 £10 SHARES PAYING 5 PER CENT. DIVIDEND.

The Company was Established over 30 Years ago.

DIVIDENDS OF NOT LESS THAN 5 PER CENT. PAID FOR LAST 13 YEARS.

WATER-RENTAL 12 YEARS AGO WAS £6671; LAST YEAR IT EXCEEDED £24,000.

Population in 1881 was 7979; now nearly 40,000.

MR. ALFRED RICHARDS will Sell the ABOVE SHARES BY AUCTION, at the Mart, London, E.C., on Tuesday, the 7th of June, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

BARKING GAS COMPANY.

NEW ISSUE OF £6000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

GAS AND WATER ORDINARY STOCKS AND SHARES

IN THE

WEST SURREY WATER COMPANY,
WEST HAM GAS COMPANY,
BARKING GAS COMPANY,
ILFORD GAS COMPANY.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 7, at Two o'clock in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, "Langley," Wyke Avenue, WORTHING.

By order of the Executors.

REIGATE GAS COMPANY.

£2130 ORDINARY STOCK and 119 £10 SHARES (£5 paid).

MAPLE & CO. have received Instructions from the Executors of the late Richard Kelsey, Esq., to SELL the above BY AUCTION, at Laker's Hotel, Redhill, on Wednesday, June 22, 1904, at Six o'clock.

Particulars of the AUCTIONEERS, 109, King's Road, BRIGHTON, LONDON, and EASTBOURNE.

By order of the Executors.

EAST SURREY WATER COMPANY.

£4250 PREFERENCE STOCK.

MAPLE & CO. have received instructions from the Executors of the late Richard Kelsey, Esq., to SELL the above BY AUCTION, on Wednesday, June 22, 1904, at Six o'clock.

Particulars of the AUCTIONEERS, 109, King's Road, BRIGHTON, LONDON, and EASTBOURNE.

THE BRISTOL GAS COMPANY.

IMPORTANT ISSUE OF GENERAL CAPITAL STOCK AND NEW DEBENTURE STOCK.

GEO. NICHOLS, HOWES, YOUNG, ALDER, and CO. are instructed to SELL by PUBLIC AUCTION, at their Sale-Room, 49, Broad Street, Bristol, on Thursday, the 16th day of June, 1904, at Half-past Two p.m. precisely,

IN LOTS OF £100 EACH, OR LESS,

£20,000

FIVE PER CENT. MAXIMUM GENERAL CAPITAL STOCK

AND

£5000

NEW DEBENTURE STOCK

(Bearing

INTEREST AT THE RATE OF FOUR POUNDS PER CENTUM PER ANNUM, payable Half Yearly in June and December),

OF AND IN

THE BRISTOL GAS COMPANY,

Issued by the Company under their Statutory Powers.

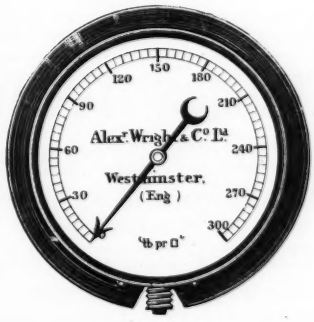
The Stock will be Sold and Registered in the Books of the Company *FREE OF EVERY EXPENSE* to Purchasers thereof.

Full Particulars and Conditions of Sale may be obtained of the AUCTIONEERS, 49, Broad Street, BRISTOL; Messrs. BRITTAN, LIVETT, AND MILLER, Solicitors, Albion Chambers, BRISTOL; or of

JOHN PHILLIPS,
Secretary.

Chief Office: Canons' Marsh, Bristol.

STEAM, OIL, and WATER.



Any Range of Pressure.

THE PETROLEUM GAS SYNDICATE

Supply and erect Complete Installations of their

PETROGENE PATENT GAS PLANT

On SALE, HIRE, or ROYALTY.

PETROGENE GAS is the most suitable Illuminant for all Towns, Villages, Factories, Institutions, &c., where a Cheap and Efficient Lighting System is required. It is equally suitable for Heating and Power purposes, and may be used with ordinary Gas Fittings, Stoves, Engines, &c. It may also be used in conjunction with Coal Gas, and affords Gas Companies a ready means of increasing their output without the expense of additional storage.

The Syndicate is prepared to entertain offers of sale of small Gas-Works, whether profit earning or not.

Offices: **28, Victoria St., Westminster.**

Works: **10, Rochester Row, S.W.**

Just Published. Crown 8vo, 6s. Cloth.

GAS-WORKS

THEIR

CONSTRUCTION AND ARRANGEMENT

And the Manufacture and Distribution of Coal Gas.

By S. HUGHES, C.E.

Ninth Edition, Revised, with Notices of Recent Improvements.

By HENRY O'CONNOR, A.M.Inst.C.E., Author of the "Gas Engineer's Pocket Book."

LONDON: CROSBY LOCKWOOD & SON, 7, STATIONERS' HALL COURT, E.C.

TELEGRAPHIC ADDRESS:— "FITZMAURICE, LONDON." TELEPHONE NO. 11,113 CENTRAL.

ROBERT B. FITZMAURICE,

4, East India Avenue, London, E.C.

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FORWARDS GOODS TO ANY PORT FROM ANY TOWN IN U.K.

Quotations if desired, & Orders promptly executed.

RAILS.

New and Second-Hand with all Accessories; also Tip Waggons and Turntables.

B. M. RENTON,

MIDLAND WORKS,

SHEFFIELD.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and yield of Gas.

Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,

CHESTERFIELD.

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Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
Shipments Promptly and Carefully Executed.

London Office: R. Cull, 34, Old Broad Street, E.C.

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T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE, MANCHESTER.

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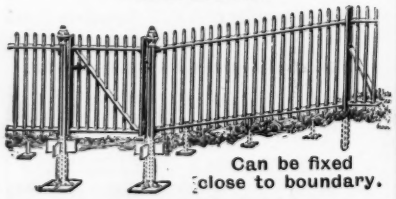

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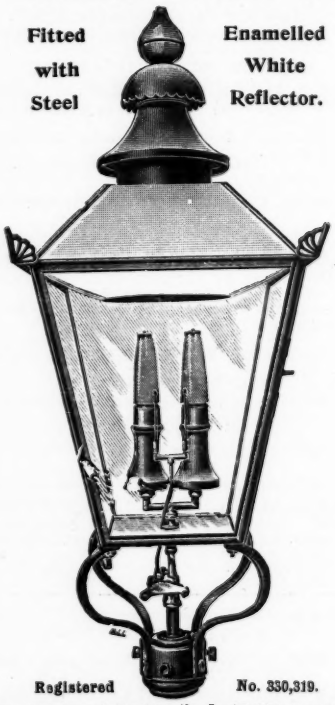

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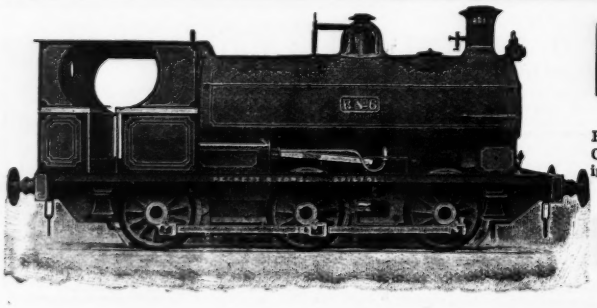

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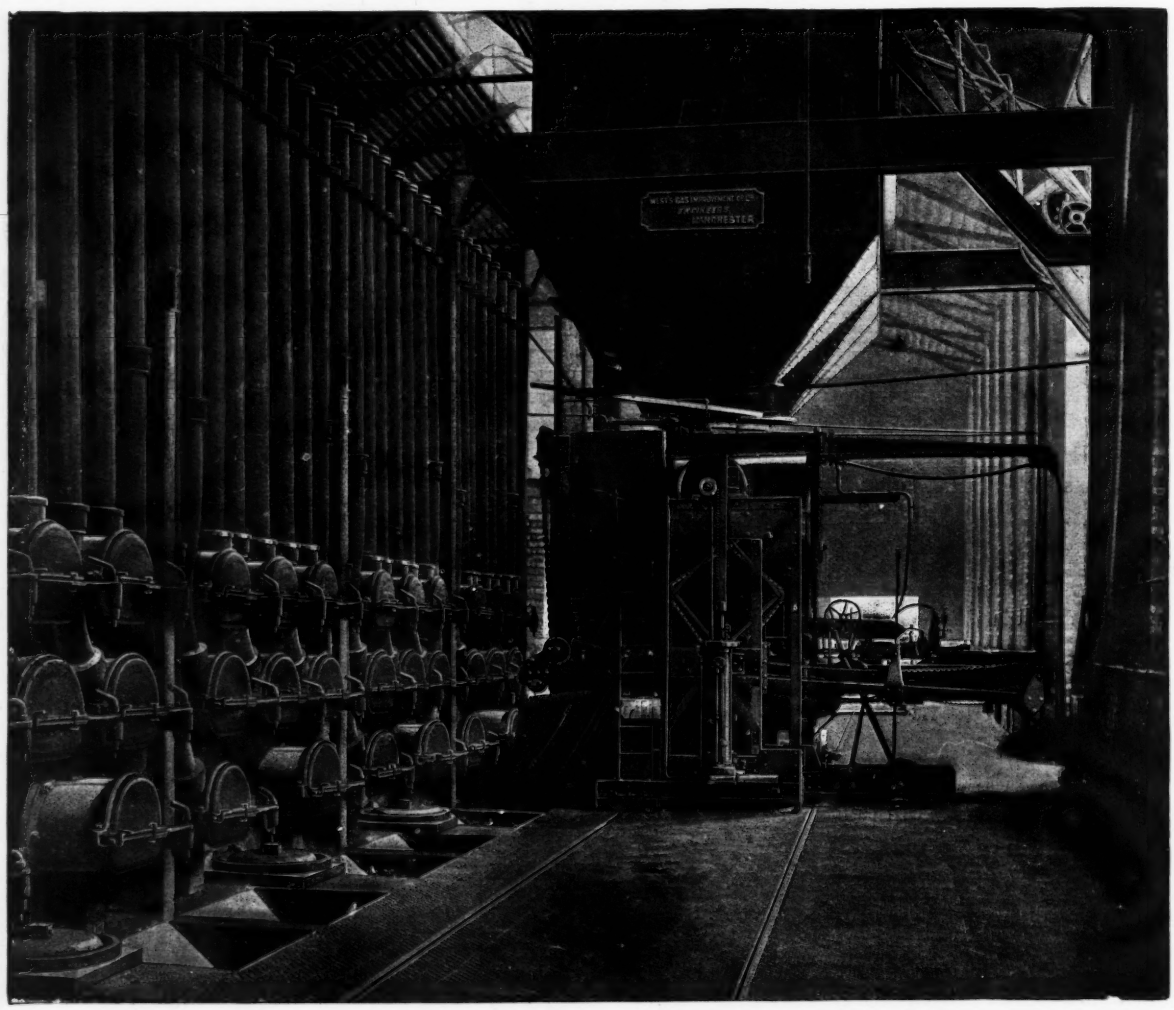

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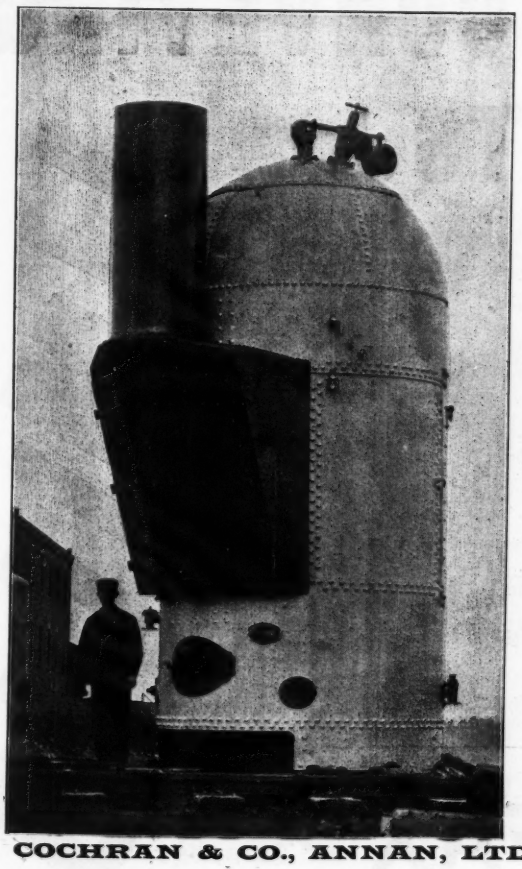

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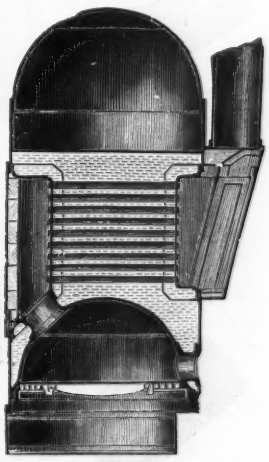

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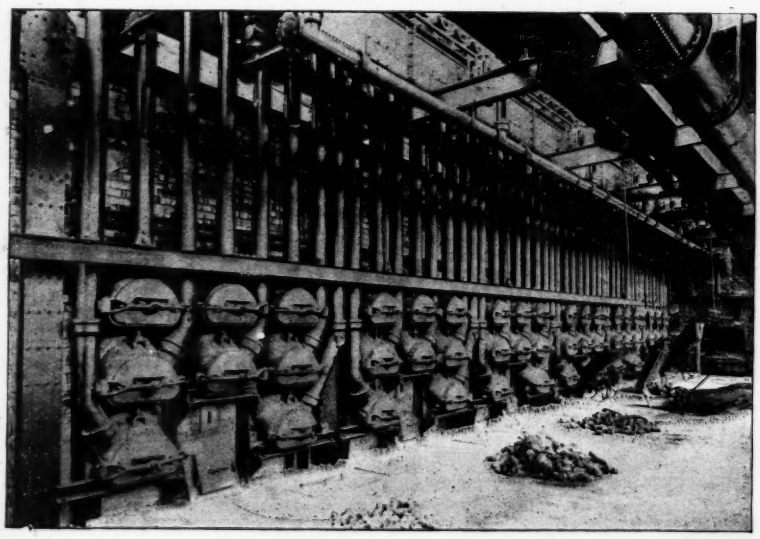

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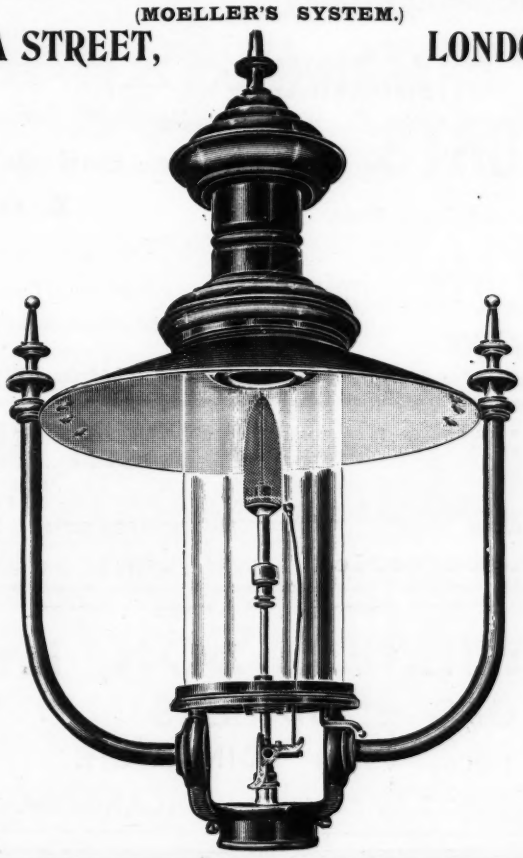

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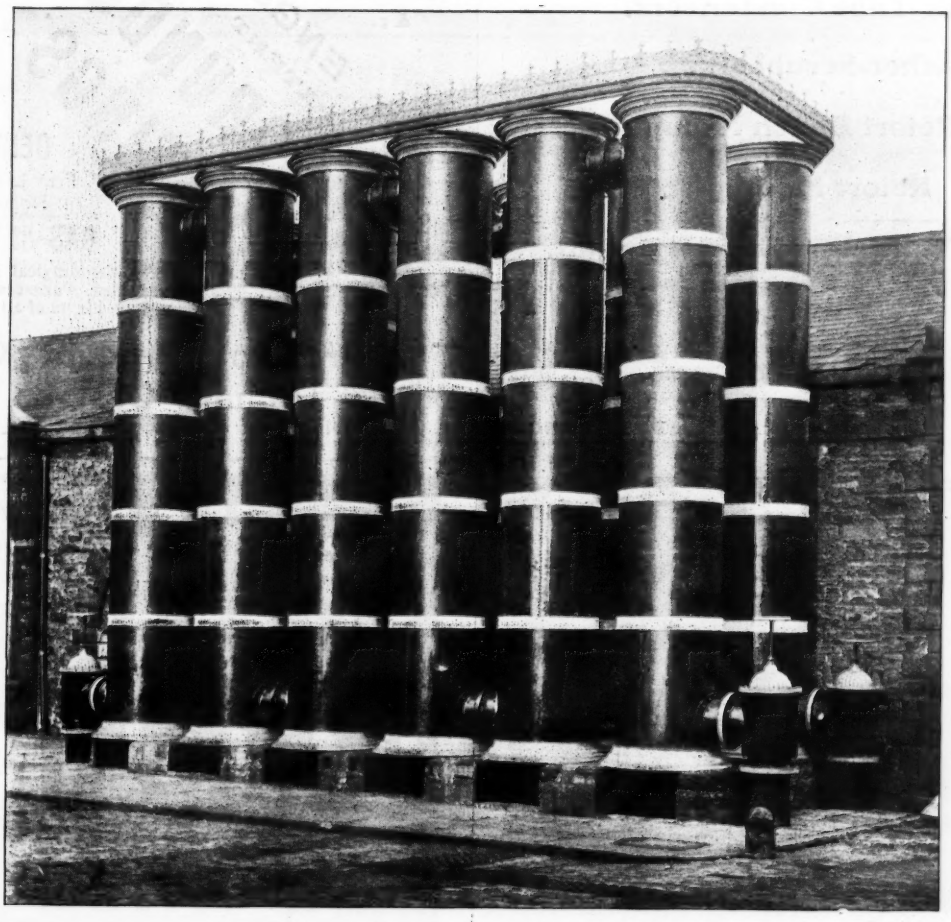

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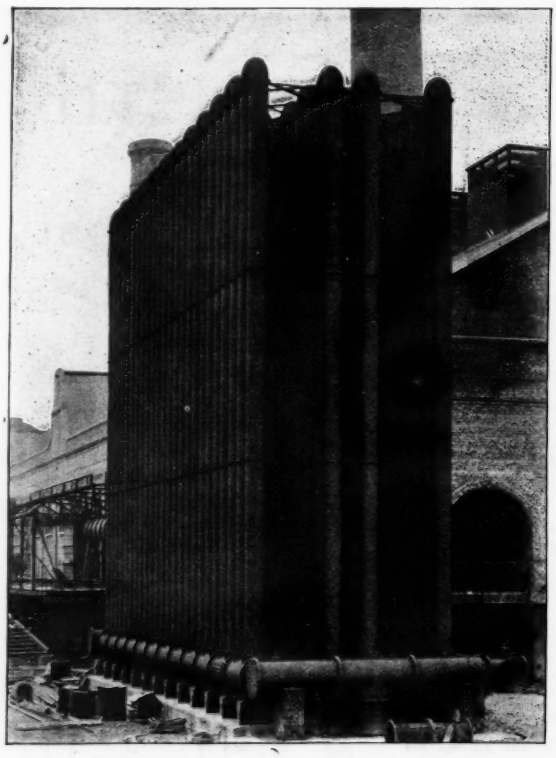

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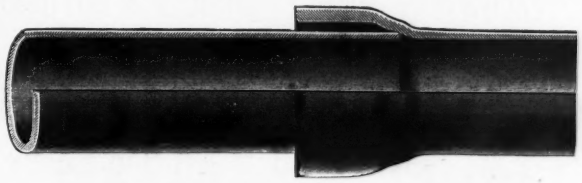

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